Book of abstracts

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the European Philosophy of Science Association

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Duesseldorf Center for Logic and Philosophy of Science (DCLPS)
Heinrich Heine University Duesseldorf, Germany

http://dclps.phil.hhu.de/

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Preface

Preface by the EPSA President

Welcome to EPSA15! This congress is already the fifth EPSA congress. After successful congresses in Madrid, Amsterdam, Athens and Helsinki, EPSA15 is held at the Duesseldorf Center for Logic and Philosophy of Science (DCLPS).

Organizing a biennial congress is one of the main activities of EPSA. The founders of EPSA felt that it is time to organize a major congress in Europe that brings together as many junior and senior European scholars in the philosophy of science as possible to present their work, exchange ideas, and to build up a network with scholars from Europe and overseas who are also very welcome at our conferences. Having a strong representation of the interests of our field vis-à-vis funding agencies is also an important task of EPSA, as providing external funding is becoming more and more vital, even in the humanities. But EPSA does much more than that. It edits a journal, the *European Journal for Philosophy of Science*, it edits a Newsletter, and it helps its members through useful information provided in the Intranet of the EPSA webpage and through regular email announcements. If you haven't checked the EPSA webpage out yet, I would like to invite you to go ahead.

Moreover, thanks to the help of various European research centers, EPSA is also able to offer several stipends for scholars from Eastern Europe to spend time at a research center in Western Europe. We believe that the resulting exchange between scholars from Eastern Europe and scholars from Western Europe will have an important effect on the development of our discipline and that the whole EPSA community will benefit from it.

The idea of providing fellowships for Eastern Europeans came up in a meeting of the EPSA Steering Committee. I am very thankful for the hard work that the members of the Steering Committee put into EPSA. At the same time, I would like to encourage you to come up with new ideas, and to help us realizing them. EPSA includes all of us, and it is for the benefit of all of us. So please participate in EPSA, volunteer for various offices, make EPSA more known in your countries, encourage your students to become EPSA

members (for a very low fee!), attend the General Assembly at this conference and discuss with us, and – if you like – donate to EPSA! The more money EPSA has at its disposal, the more initiatives we can start.

Finally, I would like to thank Gerhard Schurz and his team at the DCLPS for the excellent local organization. I would also like to thank Michela Massimi and Jan-Willem Romeijn, the co-chairs of the program committee, and all members of the program committee for putting together a great program. Finally, a big thank you to all of you for coming, for your support for EPSA, and for helping us to make EPSA15 a success. I wish us all a great conference!

Stephan Hartmann
MCMP, LMU Munich
President of EPSA

Preface by the Local Organizing Committee Chair

The Duesseldorf Center for Logic and Philosophy of Science (DCLPS) has the honor to host EPSA15, the fifth biennial conference of the European Philosophy of Science Association and to constitute its LOC. This occasion gives me the opportunity to briefly report on the history and activities of the DCLPS and of Philosophy of Science at the Heinrich Heine University (HHU) in Duesseldorf. Soon after I moved to Duesseldorf I started to enlarge my department by acquiring grants and hiring externally funded researchers, until I had built up enough financial and personal resources to organize regularly happening research events. In the first year this was confined to inviting philosophers of science from all over the world into our weekly research colloquium. Approximately 10 years ago we organized our first conference (on "compositionality, concepts and cognition"), which was followed by a series of workshops and conferences – on topics such as scientific realism, epistemological reliabilism, conditionals, modularity of mind, novel predictions, theory-ladenness and explanation. A long list of renowned philosophers of science gave talks at these events, including Nancy Cartwright, Steven French, Michael Friedman, Peter Gärdenfors, Clark Glymour, Alvin Goldman, Philip Kitcher, David Papineau, Stathis Psillos, John Worrall, and many others.

Stimulated by these great experiences the idea came up to establish the Duesseldorf Center for Logic and Philosophy of Science. This happened at the end of the year 2011. With this center firmly in place we continued to flourish and expanded our activities. Besides continuing our workshop series we started to host fellows at the DCLPS. We are also supporting EPSA in offering several stipends for scholars from Eastern Europe. Our fellowship activities started in the year 2009 with a one semester visit of Hannes Leitgeb as a Humboldt prize winner, being followed by fellowships of Kevin Kelly, Theo Kuipers, Jeff Pelletier, Jonah Schupbach, Clark Glymour and Christopher Hitchcock. DCLPS provides also the infrastructure for self-funded research fellows to visit our center and engage into our activities. Videos of, and other materials from, the talks and workshops are presented at the webpage of the DCLPS (http://dclps.phil.hhu.de). You are cordially invited

to visit this page, on which you also find information about our research activities, publications and other Philosophy of Science centers with which we cooperate.

A first summit of our activities was and still is the organization of EPSA15. A second summit will be the organization of the triannual conference of the German Philosophy of Science Association that shall take place in Duesseldorf in half a year from now, in March 2016. Concerning EPSA15, its organization at the HHU proved more difficult than we originally thought, because of some unforeseeable technical problems. Eventually we managed to solve these problems, thanks, in no small part, to our great local organization team. It consists of Alexander Christian, Christian Feldbacher, Alexander Gebharter, Nina Retzlaff and Ioannis Votsis – I want to express my sincere thanks to the great efforts made by these people. Last but not least I wish to thank all of you, the participants and contributors of EPSA15. So let us look forward to an exciting conference!

Gerhard Schurz
DCLPS, Dept. Philosophy, HHU Duesseldorf
Chair of LOC

Philosophy of Science in Germany

A talk on the situation of Philosophy of Science in Germany should start with some history. Before World War Two, one important figure in this enterprise was Hans Reichenbach and his "Berlin Group". Reichenbach was in close co-operation with Rudolf Carnap, who was born in Ronsdorf (now a part of Wuppertal), 30 km away from Duesseldorf. Carnap's birth house, the "Villa Carnap", can still be visited there. Carnap studied logic and philosophy with Gottlob Frege in Jena and later on joined the Vienna Circle. In 1930 Hans Reichenbach and Rudolf Carnap founded the journal Erkenntnis as a major platform for modern philosophy of science. The take-over of the Nazi regime in Germany stopped this young movement of European philosophy of science for a while, but not forever. After World War Two, the re-establishment of philosophy of science in Germany began with Wolfgang Stegmüller, who was appointed at the University of Munich in 1958. In a series of books he re-introduced to Germany the central problems and ideas underlying the modern philosophy of science movement, most of whose members had migrated to England or the USA during World War Two. Besides Wolfgang Stegmüller, also his student Franz von Kutschera, Paul Lorenzen and the Erlangen constructivist school, Erhard Scheibe, Lorenz Krueger and Alwin Diemer from the University of Duesseldorf – the list could be continued – contributed significantly to the re-establishment of philosophy of science in post-war Germany.

Two years ago three members of the DCLPS team – Matthias Unterhuber, Alexander Gebharter, and Gerhard Schurz – wrote a report on philosophy of science in Germany for the Journal for General Philosophy of Science. Our study was based on a questionnaire in which 159 German academic philosophers participated. Let us give you some relevant numbers. In the year 2012, there were 34 professorships in philosophy of science in Germany and 14 professors with a research focus on philosophy of science. The universities with the highest numbers of philosophers of science were the Ludwig Maximilian University of Munich (n = 11), the University of Duesseldorf (n = 7), the Ruhr University of Bochum (n = 6), and the Humboldt University of Berlin, the Technical University Munich, and the University of Muenster (n = 5 each). The reports of the 159 participating philosophers of science in Germany suggest a strong interest in general philosophy of science (n = 110),

followed by philosophy of physics (n = 39), history of philosophy of science (n = 27), and philosophy of logic and mathematics (n = 26). The top 5 research interests turned out to be causality (n = 23), theories and paradigms (n = 17), induction and confirmation (n = 16), explanation and understanding (n = 16), and models and simulations (n = 16). More than a third of the publications of German philosophers of science that they considered as their most important ones appeared in philosophy journals, while a fourth of these publications were monographs and a fourth articles in edited volumes. The five journals in which most philosophers of science published were Synthese with 9.9% of the journal-based publications, the Journal for General Philosophy of Science with 8.8%, Philosophia Naturalis with 6.8%, Philosophy of Science with 6.4%, and Erkenntnis with 5.4%. Concerning the five most frequently chosen publishers: 11.7% of the book-based publications were published with Springer, 7.9% with Mentis, 7% with Ontos, 5.8% with De Gruyter, and 3.3% with Suhrkamp.

Regarding externally funded research projects in Germany, questionnaire participants reported 217 externally funded research projects between 1992 and 2012, which is a quite high number. 43.2% of these projects were funded by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), 5.8% by the Volkswagen Foundation, 5.4%, by the Swiss National Science Foundation (SWS), 3.3% by the Fritz Thyssen Foundation, 2.9% by the Alexander von Humboldt Foundation, and 2.5% by the Federal Ministry of Education and Research (Bundesministerium fuer Bildung und Forschung).

In conclusion, German philosophers of science are very active and clearly visible within the European and international community. For more details on the situation of philosophy of science in Germany you are cordially invited to have a look at our paper (Unterhuber, M., Gebharter, A. & Schurz, G. (2014). Philosophy of science in Germany, 1992–2012: Survey-based overview and quantitative analysis. *Journal for General Philosophy of Science, 45*(1, suppl.), 71–160).

Alexander Gebharter and Gerhard Schurz
DCLPS, Dept. of Philosophy, HHU

Programme Overview

WEDNESDAY, Sep 23th

09:00 – 12:00	**Pre-events to EPSA15**: Meetings of Related Societies (Rooms 5E, 5G and 5H)
11:00 – 14:00	**Registration** (Foyer)
14:00 – 14:30	**Opening** (Room 5D)
14:30 – 16:00	**Plenary Lecture I**: Cristina Bicchieri (Room 5D)
16:00 – 16:30	**Refreshments** (served in foyer, room 52 and canteen)
16:30 – 18:30	**Parallel Sessions I** (Rooms 5D, 5E, 5F, 5G and 5H)
18:45 – 21:00	**Reception** (Oeconomicum, Building 24.31, 3 min walk (see map))

THURSDAY, Sep 24th

09:30 – 11:30	**Parallel Sessions II** (Rooms 5F, 5H, 5D, 5E and 5G)
11:30 – 12:00	**Poster Session** (Room 34)
12:00 – 13:00	**Lunch Break**
13:00 – 15:00	**Parallel Sessions III** (Rooms 5D, 5E, 5G, 5F and 5H)
15:00 – 15:30	**Refreshments** (served in foyer, room 52 and canteen)
15:30 – 17:30	**Parallel Sessions IV** (Rooms 5F, 5E, 5D, 5G and 5H)
17:40 – 19:10	**Plenary Lecture II**: Igor Douven (Room 5D)
19:15	**Departure to Conference Dinner** (Meeting at main entrance, walking to station Christophstraße: 19:29 (tram 713), [for delayed persons: 19:49 (tram 713), 19:52 (tram 701)]. Exit at station Heinrich-Heine-Allee, there take exit to Bolkerstrasse.)
19:45	**Conference Dinner** (Brauerei *Zum Schlüssel*, Bolkerstraße 41 – 47)

FRIDAY, Sep 25th

09:30 – 11:30 **Parallel Sessions V** (Rooms 5D, 5F, 5E, 5G and 5H)

11:30 – 12:00 **Poster Session** (Room 34)

12:00 – 13:00 **Lunch Break**

13:00 – 15:00 **Parallel Sessions VI** (Rooms 5D, 5F, 5E, 5G and 5H)

15:00 – 15:30 **Refreshments** (served in foyer, room 52 and canteen)

15:30 – 17:30 **Parallel Sessions VII** (Rooms 5G, 5F, 5D, 5E and 5H)

17:40 – 19:10 **EPSA General Assembly Meeting** (Room 5D)

19:15 – 20:15 **EPSA Women's Caucus** (Room 5E)

SATURDAY, Sep 26th

09:30 – 11:30 **Parallel Sessions VIII** (Rooms 5D, 5E, 5F, 5G and 5H)

11:30 – 12:00 **Poster Session** (Room 34)

12:00 – 13:30 **Conference Lunch** (served in foyer, room 52 and canteen)

12:00 – 13:30 **Graduate Students Gathering** (Room 22)

13:30 – 15:30 **Parallel Sessions IX** (Rooms 5F, 5D, 5G, 5E and 5H)

15:30 – 16:00 **Refreshments** (served in foyer, room 52 and canteen)

16:00 – 17:30 **Plenary Lecture III**: Marcel Weber (Room 5D)

17:30 – 18:00 **Closing** (Room 5D)

Programme

WEDNESDAY, Sep 23th

09:00 – 12:00	Pre-events to EPSA15: Meetings of Related Societies
Room 5E	**Normative Social Science After the Great Recession** *Two Ways in which Economics has been Normative* CATHERINE HERFELD *Well-Being in Post-Crisis Economics. Should We Shift Attention from Preference Satisfaction Theory to Objective List Theories?* TOMASZ KWARCINSKI *On the Normative Uses of Social Science* JOSÉ A. NOGUERA *Confirmation Meets Social Epistemology: A Theory of Inferential Judgement* JULIAN REISS
Room 5G	**Recent Trends in the Philosopphy of Social Sciences** *Republicanism Then and Now* JAMES BOHMAN *Reviving the Philosophy of History* PAUL A. ROTH *Normativity and Social Science* STEPHEN TURNER
Room 5H	**The Problem of Applicability is Not a Problem** *How to Dissolve the Problem of the Application of Mathematics* OTÁVIO BUENO

	Mathematical Structuralism and Mathematical Applicability ELAINE LANDRY *Mathematics and Inference to the Best Explanation* ØYSTEIN LINNEBO
11:00 – 14:00 Foyer	**Registration**
14:00 – 14:30	Opening
Room 5D	**Opening Words** STEPHAN HARTMANN (President of EPSA) GERHARD SCHURZ (Chair of the LOC)
14:30 – 16:00	Plenary Lecture I
Room 5D	**Springer Lecture: Trendsetters and Social Change** CRISTINA BICCHIERI Chair: Stephan Hartmann
16:00 – 16:30	Refreshments (served in foyer, room 52 and canteen)
16:30 – 18:30	Symposia & Contributed Papers I
Room 5D Symposium	**Quo Vadis Selective Scientific Realism?** Chair: Ioannis Votsis *Case Studies and Selective Realism* ANJAN CHAKRAVARTTY *Does Realism Become More Reasonable as Theories Become More Successful?* DAVID W. HARKER *The Scientific Realism Debate in the Year 2015: A New Era of Realist Criteria and Non-Realist Historical Challenges* TIMOTHY D. LYONS

	Selective Realism: Theory Choice or Theory Synthesis? DEAN PETERS *Understanding the Selective Realist Defence against the PMI* PETER VICKERS
Room 5E Symposium	**Measure Sensitivity in the Study of Reasoning and Cognition** Chair: David Atkinson *Criteria for the Deciding between Confirmation Measures* PETER BRÖSSEL *Measure Sensitivity in Verisimilitude Theory* GUSTAVO CEVOLANI *Shannon and Beyond: Generalized Entropies and Rational Information Search* VINCENZO CRUPI *Coherentism, Pluralism and Measure Sensitivity* MICHAEL SCHIPPERS *Probabilistic Explications of Causal Strength* JAN SPRENGER
Room 5F	**General Philosophy of Science I** Chair: J. D. Trout *What is a Ceteris Paribus Law?* CARSTEN HELD *Empirical Problems for Explanationism* RUNE NYRUP *Theoretical Fertility McMullin-Style* SAMUEL SCHINDLER

	Is Interaction Conducive to Scientific Objectivity? DUNJA SESELJA
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Room 5H	**Philosophy of the Life Sciences I** Chair: Marie I. Kaiser *Building Integrated Explanatory Models of Complex Biological Phenomena: From Mill's Methods to a Causal Mosaic* ALAN LOVE *Reality as a Relational Property: The History of G-Protein coupled Receptors* ANN-SOPHIE BARWICH & KARIM BSCHIR *Causality in Pharmacology: Conceptual Analysis for a Changing Landscape* BARBARA OSIMANI *Charles Darwin and Sir John F. W. Herschel: Nineteenth-Century Science and its Methodology* CHARLES PENCE

18:45 – 21:00	**Reception** Oeconomicum, Building 24.31, 3 min walk (see map)
18:30-18:50	Arrival of participants
18:50-18:53	Greetings by the chair of the local organization committee and introduction of speakers
18:53-18:58	Music by the orchestra of the Heinrich Heine University: "Haydn‘s südamerikanische Saitensprünge" (Werner Thomas-Mifune)
18:58-19:03	Welcoming address by a representative of the Major of Düsseldorf
19:03-19:05	Music by the orchestra of the Heinrich Heine University: "Salut d'amour" (Edward Elgar)
19:05-19:10	Welcoming address by the Vice-President for International Relations, Professor Dr. Andrea von Hülsen-Esch
19:10-19:17	Music by the orchestra of the Heinrich Heine University: "Streichquartett Opus 64, No. 1, in C-Dur, I Allegro moderato" (Joseph Haydn)
19:17-21:00	Get-together with drinks and fingerfood

THURSDAY, Sep 24th

09:30 – 11:30	Symposia & Contributed Papers II
Room 5F Symposium	**Non-Causal Aspects of Scientific Explanation** Chair: Adán Sus *On the supposed Incompatibility of Causal and Non-Causal Explanations* ALISA BOKULICH *A Counterfactual Account of Non-Causal and Causal Explanations* MATHIAS FRISCH & ALEXANDER REUTLINGER *Varieties of Structural Explanations and the Notions of Explanatory Pluralism* PHILIPPE HUNEMAN *Explanatory Abstraction in a Counterfactual Framework* IDA L. S. JANSSON & JUHA SAATSI
Room 5H Symposium	**Symposium on Approaches in Philosophy of Science in Practice** Chair: Alexander Christian *Symposium on Approaches in Philosophy of Science in Practice* MARCEL BOUMANS *An Argument for Local Critique in Philosophy of the Social Sciences: The Case of Rational Choice Theory* CATHERINE HERFELD *Modeling Multi-level Disorders: Overcoming the Mechanistic-systemic Dichotomy* MARTA BERTOLASO & RAFFAELLA CAMPANER

	Science in the Flesh: The Epistemological Role of Bodily Sensations and Operations in 20th Century Oceanography LINO CAMPRUBI *Making Sense of Theoretical Practices: Scripts, Scruples, and the Mass of the Universe* JACO DE SWART
Room 5D	**General Philosophy of Science II** Chair: Carsten Held *Scientific Realism and Fundamental Physics* CARL HOEFER *Approximate Truth and Scientific Realism* ROBERT NORTHCOTT *Who is Afraid of Multiple Realisability?* FOAD DIZADJI-BAHMANI *Representation, Models and Structure: A Reconceptualization* FRANCESCA PERO, ELENA CASTELLANI & TARJA KNUUTTILA
Room 5E	**Formal Approaches to Philosophy of Science I** Chair: Theo Kuipers *Significance Testing, P-values and the Principle of Total Evidence* BENGT AUTZEN *A Measure for Partial Knowledge* DAVID ATKINSON & JEANNE PEIJNENBURG *Confirmational Holism and Theory Choice: Arrow meets Duhem* ELEONORA CRESTO, MIRANDA DEL CORRAL, DIEGO TAJER, JUAN NASCIMBENE & ALEJANDRO CASSINI

	A General Model of Diversity in Science RICO HAUSWALD
Room 5G	**Philosophy of the Cognitive Sciences I** Chair: David Hommen *Psychiatric Classification between Science and Practice* ANKE BUETER *Getting Real about Words* JASPER VAN DEN HERIK *Are Causal Accounts of Explanation always Useful? In the Case of Personality Trait Explanation they are Probably Not* LILIA GUROVA *A Frame-Based Approach for Operationalized Concepts* STEPHAN KORNMESSER
11:30 – 12:00 Room 34	**Poster Session** List of presenters and abstracts see pp.134ff
12:00 – 13:00	Lunch Break
13:00 – 15:00	Symposia & Contributed Papers III
Room 5D Symposium	**Life as Process: Reconceptualizing the Organism** Chair: Marie I. Kaiser *Introduction* JOHN DUPRÉ *Metabolic Identity: Approaches to the Particularity of Life from a Processual Perspective* ANNE SOPHIE MEINCKE *A Process-Based Understanding of Biological Boundaries* STEPHAN GUTTINGER

	Reconceptualizing the Organism: From Complex Machine to Flowing Stream DANIEL J. NICHOLSON
Room 5E Symposium	**Levels, Computation, and Causation in Cognitive Neuroscience** Chair: Alexander Gebharter *Level Distinctions and Methods for Constitutive Inference in Cognitive Neuroscience* JENS HARBECKE *Computations, Mechanisms, and the Role of the Environment* ORON SHAGRIR *Causal Relations in Mechanistic Explanations* VERA HOFFMANN-KOLSS *The False Dichotomy between Causal Realization and Semantic Computation* MARCIN MIŁKOWSKI
Room 5G	**Historical, Social and Cultural Studies in Philosophy of Science I** Chair: Vasso Kindi *Social Exclusion despite Methodological Criteria: On Biases in Scientific Quality Evaluation* ANNA LEUSCHNER *Self-Evidence in Scientific Practice* ANTONIOS BASOUKOS *Measurement Theory from the Point of View of Practical Realism on the Example of the Periodic Table of Chemical Elements* AVE METS

	Local Ontologies and the Integration of Indigenous Knowledge DAVID LUDWIG
Room 5F	**Philosophy of the Natural Sciences II** Chair: Alastair Wilson *Reaction Mechanisms in Chemistry: A Comparison Case for Accounts of Scientific Explanation* ANDREA WOODY *A Dispositionalist Theory of Laws—Without Dispositions* ANDREAS BARTELS *Unitary Inequivalence in Classical Systems* BENJAMIN FEINTZEIG *Reconceptualising Equilibrium in Boltzmannian Statistical Mechanics and Characterising its Existence* CHARLOTTE WERNDL & ROMAN FRIGG
Room 5H	**General philosophy of science III** Chair: Richard David Rus *Causal-Possibility Explanations* LANE DESAUTELS & GRANT RAMSEY *Scientific Realism as a Pragmatic Attitude* JESUS ZAMORA BONILLA *Mathematical Evidence: Pure vs Applied* JAMES ROBERT BROWN *Absolute Measures of Effectiveness* JACOB STEGENGA
15:00 – 15:30	Refreshments (served in foyer, room 52 and canteen)

15:30 – 17:30	Symposia & Contributed Papers IV
Room 5F Symposium	**Émilie Du Châtelet's Institutions de Physique** Chair: Nina Retzlaff *Émilie du Châtelet on Newtonian Attraction* JAMEE ELDER *Du Châtelet's Philosophy of Space and Time* ADRIANA M. SOLOMON *Du Châtelet on the Law of Continuity* JOHN A. HANSON *PSR and the Problem of Force: The Metaphysical Grounding of Physics in Du Châtelet and Wolff* JEREMY STEEGER *Substance and Change in the Institutions de Physique* AARON WELLS
Room 5E Symposium	**Social Norms Across Disciplines** Chair: Alexander Christian *Norm Compliance and Humeanism. A Neurocomputational Account* MATTEO COLOMBO *Insult versus Accident: Caste Culture and the Efficiency of Coordination* KARLA HOFF *Modelling Norms* CHIARA LISCIANDRA
Room 5D	**Philosophy of the Life Sciences II** Chair: Alan Love *Disease-Mongering through Clinical Trials* DAVID TEIRA, CHRISTIAN SABORIDO & MARIA GONZALEZ-MORENO

	Convergent Perspectivism NINA ATANASOVA *Extended Inheritance as Persisting Extended Organization* GAËLLE PONTAROTTI *Natural Selection: Deriving Causality from Equilibrium* HUGH DESMOND
Room 5G	**General Philosophy of Science IV** Chair: Jaakko Kuorikoski *In Defense of Historical Theories of Confirmation* CORNELIS MENKE *From Zymes to Germs: Discarding the Realist/Antirealist Framework* DANA TULODZIECKI *The Gap Between Psychological Explanation and Mechanistic Explanation* SHELDON CHOW *Measurements, Coordination, and the Problem of Representation of Physical Quantities* FLAVIA PADOVANI
Room 5H	**Formal Approaches to Philosophy of Science II** Chair: Gerhard Schurz *Interventions at the Core of Scientific Reasoning Reasoning – On De-Idealizing and Re-Idealizing Formal Logic* MARTIN MOSE BENTZEN *A Logic for the Discovery of Causal Regularities* MATHIEU BEIRLAEN & BERT LEURIDAN

	A Resiliency-Based Approach to Chance PATRYK DZIUROSZ-SERAFINOWICZ *ON THE PREFERENCE FOR MORE SPECIFIC REFERENCE CLASSES* PAUL THORN
17:40 – 19:10	Plenary Lecture II
Room 5D	**De Gruyter Lecture: Measuring Graded Membership: The Case of Color** IGOR DOUVEN Chair: Jan-Willem Romeijn
19:15	**Departure to Conference Dinner** Meeting at main entrance, walking to station Christophstraße: 19:29 (tram 713), [for delayed persons: 19:49 (tram 713), 19:52 (tram 701)]. Exit at station Heinrich-Heine-Allee, there take exit to Bolkerstrasse.
19:45	**Conference Dinner** Brauerei *Zum Schlüssel*, Bolkerstraße 41 – 47

FRIDAY, Sep 25th

09:30 – 11:30	Symposia & Contributed Papers V
Room 5D Symposium	**Newman's Objection to Structural Realism: New Approaches** Chair: Christian J. Feldbacher *Overcoming Newman's Objection* OTÁVIO BUENO *The Newman Problem and Ontic Structural Realism* JAMES LADYMAN *Newman's Objection is Dead, Long Live Newman's Objection!* SEBASTIAN LUTZ *A Carnapian Answer to Newman* THOMAS MEIER *Russell's Response to Newman: Space-Time Structuralism* THOMAS PASHBY
Room 5F Symposium	**How is Reduction achieved?** Chair: Vera Hoffmann-Kolss (?) *Reductive Explanation and Hypothetical Identities* PETER FAZEKAS *Mechanisms and Reduction in Chemistry* ROBIN HENDRY *Mechanisms and Reduction in Psychiatry - An Interventionist Perspective* LISE M. ANDERSEN *"Nothing-over-and-above-ness" without Reduction* UMUT BAYSAN

	AUTONOMY, MULTIPLE REALIZATION AND THE WAY REDUCTION IS DONE GERGELY KERTÉSZ
Room 5E	**Philosophy of Cognitive Sciences II** Chair: Lilia Gurova *Is Episodic Memory a Natural Kind?* MARKUS WERNING & SEN CHENG *Scientific Competition and Its Threat to a Neuroscience of Consciousness* SASCHA BENJAMIN FINK *On the Plurality of Explanations in the Cognitive Sciences* SILVANO ZIPOLI CAIANI *What are Phenomena in the Cognitive and Behavioral Sciences?* ULJANA FEEST
Room 5G	**Philosophy of the Natural Sciences III** Chair: Andreas Bartels *Classical Limit of a (Macroscopic) Particle in a Box. A Suggested Solution to Einstein's Objection to Bohm's Theory* (cancelled) DAVIDE ROMANO & GUIDO BACCIAGALUPPI *On the Epistemic Interpretation of Quantum Mechanics* FLORIAN BOGE *Cosmological Probabilities: General Relativity and Statistical Mechanics Writ Large* C. D. MCCOY *Typicality in Multiverse Cosmology* FERAZ AZHAR

Room 5H	**Historical, Social and Cultural Studies in Philosophy of Science II** Chair: Antonios Basoukos *The Objectivity of the Humanities: Hempel, Carnap and the Case of Lucien Febvre* FONS DEWULF *On the Role of Political Science Research in Philosophy of Science* JAANA EIGI *Well-being Intuitionism and Conceptual Adequacy in Well-being Science* WILLEM VAN DER DEIJL *The Law of Continuity, Determinateness, and the Mathematizability of Nature: Boscovich and his Contemporaries* MARIJ VAN STRIEN
11:30 – 12:00 Room 34	**Poster Session** List of presenters and abstracts see pp.134ff
12:00 – 13:00	Lunch Break
13:00 – 15:00	Symposia & Contributed Papers VI
Room 5D Symposium	**Science within Metaphysics and Metaphysics within Science: Articulating the Relationship between Metaphysics of Science and Traditional Metaphysics** Chair: Juha Saatsi *Metaphysics and Science: Rationalism and Empiricism* HELEN BEEBEE *Building Bridges with the Right Tools: Modality and the Standard Model* STEVEN FRENCH

	Situating Metaphysics of Science: Back to Square One ALEXANDRE GUAY & THOMAS PRADEU *Are the Questions of Metaphysics More Fundamental than Those of Science?* ALYSSA NEY
Room 5F Symposium	**Imprecise Probabilities** Chair: Thomas Müller *The Epistemological Significance of Imprecise Probability* JON WILLIAMSON *What do (Im)Precise Credences Represent?* JENNIFER CARR *Reply to Carr and Williamson* SEAMUS BRADLEY & GREGORY WHEELER *Carr and Williamson's Response* JENNIFER CARR & JON WILLIAMSON
Room 5E	**General Philosophy of Science V** Chair: Raphael Scholl *Explanation and Scientific Understanding* DANIEL KOSTIC *Abduction and Cultural Evolution* ILKKA NIINILUOTO *Causal Probability and Scientific Practice* MARSHALL ABRAMS *On the Limits of Causal Modeling: Spatially-Structurally Complex Phenomena* MARIE I. KAISER

Room 5G	**Philosophy of the Natural Sciences IV** Chair: Ioannis Votsis *Einstein's Physical Strategy, Energy Conservation, Symmetries and Stability* J. BRIAN PITTS *Renormalization and Relativity* JAMES FRASER *What Explains the Spin-Statistics Connection?* JONATHAN BAIN *Macroscopic Oil Droplets Mimicking Quantum Behavior: How Far can we Push an Analogy?* LOUIS VERVOORT & YVES GINGRAS
Room 5H	**Philosophy of the Life Sciences III** Chair: Ulrich Stegmann *Species Concepts as Tools* JUSTIN BZOVY *Squaring the Circle? Assessing Mechanistic Constitution With Interventions* LENA KÄSTNER & BEATE KRICKEL *Establishing Constitutional Relations, in Theory and in Practice* MICHAEL BAUMGARTNER & LORENZO CASINI *Against the Grain: An Investigative Model for the Ancestral Health Movement* RICK MORRIS
15:00 – 15:30	Refreshments (served in foyer, room 52 and canteen)

15:30 – 17:30	Symposia & Contributed Papers VII
Room 5G Symposium	**Physics and the Nature of Computation** Chair: Karim Thebault *Is Information Physical?* CHRIS TIMPSON & OWEN MARONEY *When does a Physical System Compute?* VIV KENDON & CLARE HORSMAN *The Mechanistic View of Computation and Quantum Computers* ARMOND DUWELL
Room 5F Symposium	**Situated Cognition and Scientific Practice** Chair: Markus Werning *Empiricism for Cyborgs* ADAM TOON *Building Computational Representations for Scientific Discovery: A Distributed Cognition Account* MILES MACLEOD & NANCY NERSESSIAN *Distributed Reasoning in Data-Centric Science* SABINA LEONELLI *Hardwig's Dilemma and a Hidden Individualism in Social Theories of Scientific Knowledge* (cancelled) AXEL GELFERT *Active Externalism, Virtue Reliabilism and Scientific Knowledge* ORESTIS PALERMOS

Room 5D	**Formal Approaches to Philosophy of Science III** Chair: Paul Thorn *Relative Modalities and Chance* QUINN HARR *Communism and the Incentive to Share in Science* REMCO HEESEN *Models, Postulates, and Generalized Nomic Truth Approximation* THEO KUIPERS *Thermodynamics vs. Statistical Mechanics: A Matter of Logic* THOMAS MÜLLER
Room 5E	**General Philosophy of Science VI** Chair: Lane Desautels *On a Rationale for Cognitive Values* GERTRUDE HIRSCH HADORN *The Structure of Science: From Diachronic and Synchronic Accounts* HANNE ANDERSEN *Measuring the Unmeasurable. Engineering, Mathematics, and the Computer: A New Mixture* HANS HASSE & JOHANNES LENHARD *Measuring Unification* IOANNIS VOTSIS

Room 5H	**Historical, Social and Cultural Studies in Philosophy of Science III** Chair: Willem van der Deijl *The Argument from the Good Lot: Unconceived Alternatives and 19th Century Bacteriology* RAPHAEL SCHOLL *Debating Causation in the Life Sciences: A Systems Perspective on Causes and Effects of Cancer* SARA GREEN *Metaphysics Naturalized? The Case of Classification in the Sciences* THOMAS REYDON *Philosophy in Unified Science: The Bipartite Metatheory Conception* (cancelled) THOMAS UEBEL
17:40 – 19:10 Room 5D	EPSA General Assembly Meeting
19:15 – 20:15 Room 5E	EPSA Women's Caucus

SATURDAY, Sep 26th

09:30 – 11:30	Symposia & Contributed Papers VIII
Room 5D Symposium	**The Tension between a Naturalistic and a Normative Approach to Explanation and Understanding** Chair: Jose Diez *An Evolutionary and Cognitive Approach to Understanding* JAN FAYE *On Scientific Understanding without Explanation* ANTIGONE M. NOUNOU *From Explanation to Understanding: Normativity Lost?* HENK W. DE REGT *Normativity and the Inferential Account of Understanding* PETRI YLIKOSKI
Room 5E Symposium	**Probabilities, Chances and Statistics** Chair: Nina Retzlaff *On Individual Risk* ALEXANDER P. DAWID *Unsharp Best System Chances* LUKE FENTON-GLYNN *Against Ontic Chances* (cancelled) JENANN ISMAEL *Counterfactual Probabilities, Chances and Robust Explanations* AIDAN LYON *Propensities, Chances, and Experimental Statistics* MAURICIO SUÁREZ

Room 5F	**General Philosophy of Science VII** Chair: Jesus Zamora Bonilla *Conceptualizing Uncertainty: An Assessment of the Latest Uncertainty Framework of the Intergovernmental Panel on Climate Change* NICOLAS WÜTHRICH *Causality and Natural Kinds* OLIVIER LEMEIRE *Pan-Perspectival Realism* PAUL TELLER *The No Miracles Argument without Base Rate Fallacy* RICHARD DAWID
Room 5G	**Philosophy of the Natural Sciences V** Chair: Florian Boge *No Alternatives for What? Non-Empirical Evidence in the Case of String Theory* RADIN DARDASHTI *The Borel-Kolmogorov Paradox and Conditional Expectations* MIKLOS REDEI, ZALAN GYENIS & GÁBOR HOFER-SZABÓ *Symmetries and the Identity of Physical States* SIMON FRIEDERICH *Functional Emergence of Spacetime in Quantum Gravity* VINCENT LAM & CHRISTIAN WÜTHRICH
Room 5H	**Philosophy of the Social Sciences I** Chair: Paul Thorn *What Even is Explanatory Pluralism?* (cancelled) HARDY SCHILGEN

	Do Mechanism-Based Explanations make a Case for Methodological Individualism? JEROEN VAN BOUWEL *Modeling Inequality* KARIM THEBAULT, SEAMUS BRADLEY & ALEXANDER REUTLINGER *Cooperative Game Theory, Philosophy and the Social Sciences* STEFAN WINTEIN & CONRAD HEILMANN
11:30 – 12:00 Room 34	**Poster Session** List of presenters and abstracts see pp.134ff
12:00 – 13:30	Conference Lunch (served in foyer, room 52 and canteen)
12:00 – 13:30 Room 22	Graduate Students Gathering
13:30 – 15:30	Symposia & Contributed Papers IX
Room 5F Symposium	**Theory Choice meets Social Choice** Chair: Christian J. Feldbacher *Arrow's Theorem and the Rationality of Scientific Theory Choice* SAMIR OKASHA *Can there be Neutral Choice Procedures in Science?* MICHAEL MORREAU *On the Rationality of Theory Choice* ALEXANDRU MARCOCI & JAMES NGUYEN *Evaluating Competing Theories via a Common Language of Qualitative Verdicts* WULF GAERTNER & NICOLAS WÜTHRICH

Room 5D Symposium	**Local vs. Global Approaches to Realism** Chair: Ludwig Fahrbach *Forget Perrin* (cancelled) PAUL DICKEN *Should the Debate over Scientific Realism Go Local?* LEAH HENDERSON *Kinds of Evidence for Realism: Revisiting the Case of Atomism* STATHIS PSILLOS *A Case for Local Realism* JUHA SAATSI
Room 5G	**Philosophy of the Natural Sciences VI** Chair: Simon Friederich *Events, Quantum Mechanics and the Passage of Time* MAURO DORATO *Do we Need a Primitive Ontology to make Quantum Mechanics Empirically Coherent?* MATTHIAS EGG *There are No Mathematical Explanations* JAAKKO KUORIKOSKI *Presentism meets Black Holes again* GEURT SENGERS
Room 5E	**General Philosophy of Science VIII** Chair: Richard Dawid *Kuhn's Revolutions* VASSO KINDI *How are Mechanistic Explanations Understood?* PHYLLIS ILLARI

	From Classical Mechanics, to Special Relativity Theory, and Quantum Mechanics—Or: Why Structural Realists would Profit from Studying Structural Continuity by Means of Conceptual Spaces George Masterton, Frank Zenker & Peter Gärdenfors *Explaining Complex Dynamics by Structural Mechanisms* Meinard Kuhlmann
Room 5H	**Philosophy of the Life Sciences IV** Chair: Justin Bzovy *Extrapolation in Basic Research* (cancelled) Tudor Baetu *Model Organisms and Explanation* Ulrich Stegmann *Modeling Organs with Chips: Design and Representation as Modeling Relations* Michael Poznic *Explanation, Unification, and Mechanisms* Melinda Fagan
15:30 – 16:00	Refreshments (served in foyer, room 52 and the canteen)
16:00 – 17:30	Plenary Lecture III
Room 5D	**Plenary Lecture: Causality in Dynamical Biological Mechanisms** Marcel Weber Chair: Gerhard Schurz
17:30 – 18:00 Room 5D	Closing

Abstracts

Plenary Lectures

Plenary Lecture I **Springer Lecture**
Chair: Stephan Hartmann Room 5D, Wednesday 14:30 – 16:00

Trendsetters and Social Change

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Trendsetters are the "first movers" in social change. To study the dynamics of change, we need to study the interplay between trendsetters' actions and individual thresholds. It is this interplay that explains why change may or may not occur.

Plenary Lecture II **De Gruyter Lecture**
Chair: Jan-Willem Romeijn Room 5D, Thursday 17:40 – 19:10

Measuring Graded Membership: The Case of Color

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In my talk, I discuss Kamp and Partee's semantics for languages with vague predicates and especially the account of graded membership that is part of it. In its original presentation, the semantics is known to be incomplete, lacking a proposal for determining unique degrees of membership. It has recently been shown that the semantics can be completed by embedding it in the conceptual spaces framework, as developed in the cognitive sciences. It has also been shown that, in this version, the semantics is formally correct.

However, the question of its material adequacy is still open. I report empirical work that addresses this question by testing the semantics in the domain of color. Specifically, a number of experiments are reported which are meant to determine, on the one hand, the regions in color space where the typical instances of certain colors are located, and on the other hand, the degrees of membership in various color categories of a great number of different shades. From the locations of the typical regions in conjunction with Kamp and Partee's account follow degrees of membership for the color shades we are interested in. These predicted degrees are compared with the judged degrees, as obtained in the experiments.

Plenary Lecture III **Plenary Lecture**
Chair: Gerhard Schurz Room 5D, Saturday 16:30 – 17:30

Causality in Dynamical Biological Mechanisms

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It is widely held that structural causal models based on interventionist criteria for causal asymmetry provide an adequate representation of causality in any kind of causal system. In this talk I examine a type of dynamical system that is typical for biological mechanisms in that it contains a causal feedback loop, namely a biological clock mechanism. Such mechanisms can be described qualitatively as well as quantitatively by using systems of coupled differential equations. While these equations cannot be solved analytically, they have approximate solutions using discrete time. I show that these discrete time model are fully representable as causal structural models. However, these models are not causally equivalent to the original differential model. In particular, the differential model shows a failure of modularity. This suggests that in such dynamical mechanisms interventionist causality is something that emerges only at coarse-grained, approximate descriptions of reality and not at the fundamental level of the mechanism.

Symposia & Contributed Papers I

Quo Vadis Selective Scientific Realism? **Symposium**
Organizer: Peter Vickers
Chair: Ioannis Votsis Room 5D, Wednesday 16:30 – 18:30

Case Studies and Selective Realism

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Does Realism Become More Reasonable as Theories Become More Successful?

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The Scientific Realism Debate in the Year 2015: A New Era of Realist Criteria and Non-Realist Historical Challenges

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Selective Realism: Theory Choice or Theory Synthesis?

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Understanding the Selective Realist Defence Against the PMI

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The challenge to scientific realism that emerges from the historical record continues to provoke significant discussion. The details have changed since Laudan (1981), but the spirit remains the same. Selective scientific realism is the most popular realist response to this historical challenge. But there remain historical examples that create serious problems even for selective realists, and a number of new historical challenges have recently been introduced to the literature. Thus the question remains whether even *selective* scientific realism is consistent with the historical record. There are also more foundational questions: does it even make sense to 'test' scientific realism against the history of science? And does it make sense to 'select' individual features of scientific theories for realist commitment? This symposium will illuminate the current status of selective realism, and its prospects for success.

Measure Sensitivity in the Study of Reasoning and Cognition **Symposium**
Organizer: Gustavo Cevolani, Vincenzo Crupi & Roberto Festa
Chair: David Atkinson Room 5E, Wednesday 16:30 – 18:30

Criteria for the Deciding Between Confirmation Measures

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Measure Sensitivity in Verisimilitude Theory

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Shannon and Beyond: Generalized Entropies and Rational Information Search

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Coherentism, Pluralism and Measure Sensitivity

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Probabilistic Explications of Causal Strength

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Formal models are increasingly used in the analysis of reasoning and cognition. Indeed, a plurality of non-equivalent models have been put forward for a number of key concepts in this area. As a consequence, important theoretical arguments turn out to be measure sensitive, in the sense that their soundness varies, depending on which specific model is adopted. This problem was originally raised for probabilistic theories of confirmation (Festa 1999, Fitelson 1999), but it branches out widely. This proposal aims at an integrated assessment involving five central issues and their multiple connections: coherence, confirmation, explanatory power, informativeness, and verisimilitude.

General Philosophy of Science I **Contributed Papers**
Chair: J. D. Trout Room 5F, Wednesday 16:30 – 18:30

What is a Ceteris Paribus Law?

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According to the classic deductive-nomological account of scientific explanation, an ideal explanation is a sound argument for the explanandum using a law of nature. This characterization is easily shown to be insufficient for an explanation. Showing it to be necessary for an ideal explanation depends on showing the law statement involved to be true. The law expressed basically is a Ceteris Paribus (CP-) law. Understanding CP-laws can aid understanding the general role of laws in ideal explanations. I propose to interpret them simply as natural language (NL-) conditionals. The latter, it turns out, must be understood as tacitly quantified over situations, where situations making the consequent false without making the antecedent true are explicitly excluded. By this construction an NL-conditional is both falsifiable and immune to far-fetched possible situations. Such immunization is what we need to understand CP-laws as NL-conditionals, considered within the context of an explanation.

Empirical Problems for Explanationism

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I criticise the empirical premises in two kinds arguments for the reliability of inference to the best explanation. The first kind, direct (inductive) arguments, face a version of the pessimistic induction: the history of science is full of theories which provided very good explanations but turned out to be false. The standard realist responses to the pessimistic induction – focusing on novel predictions and working posits – only exacerbates the problems for

explanationism. The second, indirect type of arguments rely on the premise that explanatory reasoning plays an important role in scientific practice, assuming that this role is to act as a guide to the (approximate) truth of theories. I argue that explanatory reasoning in case studies usually taken to support explanationism is more plausibly described as being used to generate and select hypotheses worthwhile pursuing further.

Theoretical Fertility McMullin-style

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A theory's fertility is one of the standard theoretical virtues. But how is it to be construed? In current discourse theoretical fertility is usually understood in terms of novel success: a theory is fertile if it manages to make successful novel predictions. A different construal of theoretical fertility, which hasn't played a major role in recent discussions, can be found in Ernan McMullin's work. My assessment of McMullian fertility is divided. Although I will defend McMullian fertility as a genuine virtue against Daniel Nolan's attempt to reduce it to novel success, I shall question the realist rationale offered for it by McMullin.

Is Interaction Conducive to Scientific Objectivity?

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A point often made in the literature on scientific pluralism is that interaction among scientists is a necessary condition for scientific objectivity. This stance has been challenged by Kevin Zollman. In view of a game-theoretic model Zollman has argued that reliable scientific knowledge requires either a restriction of the information flow among scientists or the scientists to have extreme beliefs regarding their pursued hypotheses. In this paper I

challenge some basic ideas underlying Zollman's model by showing that it is based on unwarranted assumptions about how scientists evaluate their hypotheses and how they respond to new evidence.

Philosophy of the Natural Sciences I **Contributed Papers**
Chair: Andreas Bartels Room 5G, Wednesday 16:30 – 18:30

The Equivalence Principle and Dynamical Explanations

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In this paper I have two objectives related to the physical interpretation of the Equivalence Principle (EP). The first one aims directly at contributing to the discussion about the right formulation of the Equivalence Principle in the context of General Relativity. In relation to this, I offer a formulation of the principle that, contrary to other proposals, incorporates the idea of inertial structure not being determined independently from matter fields (arguably capturing Einstein's intuition of the equality of inertia and gravity). I also discuss whether such a formulation clarifies the place of EP in the foundations of the theory. My second aim is to translate the insights from the previous discussion to a debate belonging to the interpretation of Special Relativity. I argue that a restriction of EP can be used in the explananda of special relativistic phenomena and that this sheds light on the debate about the, either dynamical or kinematical, character of the explanations in SR.

Naturalising Recombination

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Recombination principles are apparently key to the extensional adequacy of realist theories of modality, yet their epistemic status remains mysterious.

One way to deflate this mystery would be to offer a naturalistic account of the metaphysics of recombination, allowing that different recombination principles can in principle be confirmed or disconfirmed empirically. I offer an account of recombination as grounded in the Schrödinger equation, drawing on a modal realist interpretation of Everettian (many-worlds) quantum mechanics. Recombination, instead of being non-fundamental and prior to laws of nature, becomes a non-fundamental law of nature; recombination is also connected in a novel way to the conservation of probability. Still, the Schrödinger equation plays the same basic theoretical role as more familiar principles of recombination: in particular, it can ensure that the theory of modality embedding it meets David Lewis' controversial criterion of plenitude.

On the Notion of A-Spatiotemporal Beables in Quantum Gravity, or: Can we Dispense with Space and Time as Fundamental Categories?

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One of the most remarkable contentions in the research for a theory of quantum gravity (QG) is that spacetime might not be fundamental, but "emergent" from an ontological ground floor made up of a-spatiotemporal elements of reality. Starting from this controversial claim, the paper considers the question whether a metaphysics that acknowledges the primacy of physics over the special sciences could dispense with space and time as fundamental categories, and by what means it might do so. The inquiry focuses on the notion of local beable and its role in bridging ontological and empirical aspects of a physical theory. In particular, it is discussed what kind of modifications such a concept should undergo in order to fit the QG context. Finally, a tentative proposal will be put forward concerning the minimal metaphysical requirements that beables for a theory of QG should meet in order to be considered genuine elements of reality.

Parts, Wholes and Potentials

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The Special Composition Question asks under what conditons several objects form another, composite object. We propose a conditon grounded in our physical knowledge of the world. In contrast to standard mereological theories, we define the part-whole relation in terms of the concept of compositon rather than the other way around. We provide a variety of reasons in favour of our mereological theory, one of which being that it does not suffer from the uniqueness problem.

The core of our answer is that objects compose a whole iff they are in a common bound state, that is, in a potential well that results from their mutual physical interaction.

Philosophy of the Life Sciences I **Contributed Papers**
Chair: Marie I. Kaiser Room 5H, Wednesday 16:30 – 18:30

Building Integrated Explanatory Models of Complex Biological Phenomena: From Mill's Methods to a Causal Mosaic

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Mill's methods involve two idealizations ("one cause, one effect" and "no mixing of effects"), but causal relations usually exhibit a plurality of causes and intermixture of effects. Building models to capture these relations remains a challenge because similar idealizations occur in current causal models (e.g., difference making and production). The problem is poignant for formulating integrated accounts across disciplinary approaches, such as combining physical and genetic causes to understand their joint contribution to the developmental origin of anatomical structures. I argue that a

causal mosaic of difference making and production conceptualizations of genetic and physical causes can be built into integrated explanatory models using external periodizations of time. A consequence of this strategy is a tradeoff between models that yield causal generalizations of wide scope and models that integrate different types of causes to comprehensively explain complex phenomena.

Reality as a Relational Property: The History of G-Protein coupled Receptors

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This paper tells the story of G-protein coupled receptors (GPCRs), one of the most exciting objects of investigation in contemporary biochemistry and molecular biology. By looking at how GPCRs turned from a hypothetical entity into a real one, we demonstrate that the realism question requires a philosophical perspective in which scientific objects are analysed as active elements within a specific research context. We claim that the activity of a scientific object is constituted by its capacity to act as a touchstone for the reality of other things. The selection of criteria, whereby an object is assigned varying degrees of reality throughout a scientific discourse, cannot be made independently of the question of how this object becomes a standard by which the reality of 'neighbouring elements' (other entities, mechanisms, processes) is evaluated. We conclude that the reality of a scientific object is a relational property acquired in a historical context of successive methods.

Causality in Pharmacology: Conceptual Analysis for a Changing Landscape

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The methodological landscape of pharmacology is rapidly changing both through the gradual diffusion of Bayesian methods, as well as by the development of so called "systems pharmacology". These two paradigms respond on one side to the acknowledgement of the uncertainty intrinsic in pharmacology, and on the other to its multilevel scope. However, in what sense knowledge discovery techniques can be said to provide causal knowledge? How do they differ from epidemiological or experimental evidence? These question will be addressed by analysing the techniques developed for predicting side effects of drugs based on their biochemical features and on the integrated information of different databases. It will turn out that the kind causal knowledge derived from such methods is very fragile, and the reason for this is that it still relies on "universal" causal chains rather than on "context-dependent" causal webs, thereby abstracting from heterogeneity and background conditions.

Charles Darwin and Sir John F. W. Herschel: Nineteenth-Century Science and its Methodology

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There is a bewildering variety of claims connecting Darwin to nineteenth-century philosophy of science – including to Herschel, Whewell, Lyell, German Romanticism, Comte, and others. I argue here that Herschel's influence on Darwin is undeniable. The form of this influence, however, is often misunderstood. While Jon Hodge has worked out a careful interpretation of both Darwin and Herschel, this interpretation misreads Herschel's use of the vera causa principle, as well as the role of hypotheses in scientific theory construction. This new reading of Darwin's relationship to Herschel adds to the usual collection of sources Herschel's own Marginalia To Darwin's Origin.

Symposia & Contributed Papers II

Non-Causal Aspects of Scientific Explanation **Symposium**
Organizer: Alexander Reutlinger & Mathias Frisch
Chair: Adán Sus Room 5F, Thursday 09:30 – 11:30

On the Supposed Incompatibility of Causal and Non-Causal Explanations

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A Counterfactual Account of Non-Causal and Causal Explanations

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Varieties of Structural Explanations and the Notions of Explanatory Pluralism

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Explanatory Abstraction in a Counterfactual Framework

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In current philosophy of science, the most widely accepted account of scientific explanation is the causal account. According to the causal account, to

explain a phenomenon is to identify its causes. We argue that a re-evaluation of the received causal account is needed for the following reason: the causal account cannot provide a general theory of all scientific explanations, since there are compelling examples of what appear to be non-causal explanations. Examples of non-causal explanations come in a surprising diversity: for instance, the non-causal character of scientific explanations is based on the explanatory use of non-causal laws, purely mathematical facts, symmetry principles, renormalization group methods, intertheoretic relations, and so forth. However, the philosophical reflection of non-causal explanation is still underdeveloped and deserves more attention. The goal of this symposium is to develop an improved understanding of non-causal explanations in the sciences.

Symposium on Approaches in Philosophy of Science in Practice **Symposium**
Organizer: Marcel Boumans
Chair: Alexander Christian Room 5H, Thursday 09:30 – 11:30

Symposium on Approaches in Philosophy of Science in Practice

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An Argument for Local Critique in Philosophy of the Social Sciences: Thee Case of Rational Choice Theory

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Modeling Multi-level Disorders: Overcoming the Mechanistic-systemic Dichotomy

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Science in the Flesh: The Epistemological Role of Bodily Sensations and Operations in 20th Century Oceanography

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Making Sense of Theoretical Practices: Scripts, Scruples, and the Mass of the Universe

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The Society for Philosophy of Science in Practice grew out of a recognition of the need to promote the philosophical study of "science in practice", by which is meant both scientific practice and the functioning of science in practical realms of life. Despite occasional exceptions such as some recent literature on models, experimentation, and measurement which have engaged in detailed consideration of scientific practices in pursuit of their philosophical points, concern with practice has tended to fall outside the mainstream of analytic philosophy of science. SPSP was founded with the aim of changing this situation, through the promotion of conscious, detailed, and systematic study of scientific practice that nevertheless does not dispense with concerns about truth and rationality.

The purpose of this session is to present some of its approaches in studying scientific practices that have begun to emerge as SPSP has taken shape and grown.

General Philosophy of Science II **Contributed Papers**
Chair: Carsten Held Room 5D, Thursday 09:30 – 11:30

Scientific Realism and Fundamental Physics

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In discussions of SR, physical theories get more attention than those of all the other sciences combined. I believe this is a mistake.

In this paper I will argue that our current fundamental physics theories are by no means things which we can regard as approximately true, nor are their posited entities clearly things that we should believe to exist. In this respect fundamental physics theories - despite their enormous empirical successes - are quite unlike the majority of the rest of what we take to be our best current theories in the mature sciences. These other theories and sciences are secure in a way that fundamental physics cannot be, now or in the foreseeable future.

Mathias Egg (2012) discusses the special problems of fundamental physics theories and defends a "causal" realism to evade them; I will argue that his solution does not resolve the problems I raise.

Approximate Truth and Scientific Realism

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Historically, the motivation for defining a scientific theory's approximate truth has mainly come from the scientific realism debate. Indeed, finding such a definition has been seen by some as essential for buttressing the realist position. As anti-realists often point out, philosophers have had great difficulty in giving a plausible and consistent account of approximate truth. Yet a good and useful definition of it can be found nevertheless – but only once we cast off this inherited entanglement with scientific realism. It turns

out that influential recent work in the causation literature is a much more fertile inspiration, as approximate truth can be well defined in causal terms. The crucial move is to change our focus from theories as a whole instead to application-specific models.

Who is Afraid of Multiple Realisability?

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Multiple realizability is an important issue in the context of reduction. Putative multiply realizable properties (MRPs) have been used in a variety of ways to argue both against reductionism and against specific reductions. One class of such arguments pertains to ontological simplification: it is widely claimed that ontological simplification is required for successful reduction. However, MRPs undermine the ontological simplification that a reduction is to afford, or so it has been argued. I proffer a novel route to ontological simplification, one which is not undermined by MRPs. I then preempt one important potential criticism of this approach, and argue against it.

Representation, Models and Structure: A Reconceptualization

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This paper concerns the notion of structure as employed when considering models and representation in science. Which kind of structure to consider

with respect to models, and how this structure is used and related to a target system for the model to "represent", is a crucial point in the relevant literature. We argue that a source of confusion in current debates has to do with a misleading use of structures. Such use is misleading in two senses. First, for not clearly distinguishing between the two levels at which the use of models takes place (we borrow the distinction by French 2012): the "object-level" of working scientists, and the "meta-level" of philosophical analysis, where the results at the object-level are reconceptualized in terms of abstract structures. Second, for inadequately identifying the relevant structures at stake when considering the representational function of models. We argue for this point by using examples from physics, biology and economics.

Formal Approaches to Philosophy of Science I **Contributed Papers**
Chair: Theo Kuipers Room 5E, Thursday 09:30 – 11:30

Significance Testing, P-Values and the Principle of Total Evidence

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The paper examines the claim that significance testing violates the Principle of Total Evidence (PTE). I argue that this claim is incomplete, as the application of PTE requires the prior specification of a criterion for evidential assessment. Further, I argue that even when a likelihood criterion for evidential assessment is presupposed, using p-values for inductive inference does not necessarily violate PTE. In particular, I describe conditions under which no conflict arises between the use of p-values and PTE from a likelihoodist perspective.

A Measure for Partial Knowledge

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Belief comes in degrees, but the same cannot be said of knowledge. Although dissenting voices have been heard, claiming that knowledge is not categorical, it remains unclear how exactly knowledge might be gradable, let alone how to measure the grades. Thus the received view is still that knowledge does not countenance degrees. In this paper we investigate the feasibility of a dissident stance. We introduce what we call 'partial knowledge' and we explain in detail how to measure it.

We start from the work of Timothy Williamson, despite the fact that he is one of the philosophers who is strongly opposed to the notion of graded knowledge. We argue that our measure can be regarded as a generalization of Williamson's approach, turning the latter into a limiting case. Moreover, our measure avoids certain counter-intuitive consequences that follow from Williamson's model.

Confirmational Holism and Theory Choice: Arrow meets Duhem

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Recent papers explore the application of a social choice framework to the problem of choosing among competing scientific theories or hypotheses. This strategy, however, leads to a pessimistic conclusion, as it replicates Arrow's impossibility result within the realm of theory choice. In this communication we argue that Arrow's theorem does not apply to the amalgamation of evidence. The reason is that we cannot escape the well-known Duhem-Quine problem –the evidence actually confirms (or disconfirms) complex sets containing central and auxiliary hypotheses. This situation forces us to restrict the domain of a reasonable choice function; we prove that the restriction is strong enough to avoid Arrow's result. The upshot is that we are now able to see conformational holism under a different, positive light: we are able to interpret it as a phenomenon that makes theory choice possible in the first place, when there are at least three options on the table.

A General Model of Diversity in Science

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Although diversity is among the central issues in today's philosophy of science, its conceptual foundations are not yet sufficiently understood. This paper aims to remedy this shortcoming by developing a general model of diversity in science. Using the ecological notion of biodiversity as a comparison case, I first develop a model of diversity in general, featuring a distinction between diversity types and dimensions. Types arise from the considered objects (e.g., species, theories, methods, subject matters, social categories, etc.); dimensions concern the factors that have an influence on the diversity of these objects (the most important dimensions are richness, evenness, and dissimilarity). In the second part, I apply this model to scientific communities by correlating each relevant type with each dimension and discuss what it would mean to maximize and to minimize diversity on this dimension. In doing so, a crucial aspect is to clarify how to individuate the objects in question.

Philosophy of the Cognitive Sciences I **Contributed Papers**
Chair: David Hommen Room 5G, Thursday 09:30 – 11:30

Psychiatric Classification between Science and Practice

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Current psychiatric classification is based on observable symptoms of mental disorders – a fact that many critics hold accountable for its problems, such as heterogeneity, comorbidity, and lack of predictive success. Therefore, it is often argued that it is time to move on to an etiology-based system, in which diagnostic categories are informed by theories about their underlying causes. Proponents of such an "etiological revolution" often present it as a move forward towards a more scientific, evidence-based nosology. What I want to show is, first, that the question of the classificatory basis is not one that can be answered by empirical evidence alone. Instead, it requires (value-)judgments on what level of evidence is needed to justify changes, as well as (value-)judgments on what kind of evidence is most important. Second, in making these judgments the needs of clinical practice and scientific research often have to be weighed against each other.

Getting Real about Words

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Self-styled Radical Enactivists Hutto and Myin claim that whereas 'basic' cognition is non-representational, linguistic cognition does involves representational content. I argue that this distinction is problematic. I focus on two closely related arguments: (1) we cannot decide when an utterance it a repetition of an abstract type – which determines the content expressed – without relying on the mental representations the Enactivist denies; and (2) the Enactivist lacks the resources to explain how a person comes to know that a

word stands for a worldly object. Content then only comes into play from the point of view of an observer who focusses only on the products of linguistic behaviour. Although I do not deny that we often talk about the world, from an Enactivist point of view we cannot explain our linguistic abilities in representational terms. Language is best explained as an activity aimed at the coordination of behaviour through constraining cognitive and interpersonal dynamics.

Are Causal Accounts of Explanation always Useful? In the Case of Personality Trait Explanation they are Probably Not

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The attacks on personality trait explanations are often based on demonstrations that the attempts to construe traits as causes of behavior run into serious logical and conceptual problems. In this paper I argue for a non-causal account of trait explanations which avoids the conceptual traps of the causal construal and which better reveals in virtue of what personality traits explain. The proposed non-causal account builds on the idea that a good explanation increases our understanding of the explained phenomenon and that the increase in understanding supervenes on the increase of the inferential content of the explanandum.

A Frame-Based Approach for Operationalized Concepts

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Frames are used as a tool for reconstructing scientific concepts as well as conceptual change within scientific revolutions. In frame-based representations of scientific concepts developed so far, the semantic content of concepts is (partially) determined by a set of attribute-specific values. This way

of representing semantic content works best for well-defined scientific concepts and their subordinate concepts within a conceptual taxonomy.
Beside defined concepts, operationalized concepts play an important role in science. However, so far no frame-based representation of operationalized concepts has been developed. In my talk, I will show that frame-based representations of defined concepts have a different structure than frame-based representations of operationalized concepts. In order to explicate this difference, I will develop a frame-based method for representing concepts by means of mathematical graph-theory..

Symposia & Contributed Papers III

Life as Process: Reconceptualizing the Organism **Symposium**
Organizer: John Dupré
Chair: Marie I. Kaiser Room 5D, Thursday 13:00 – 15:00

Introduction

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Metabolic Identity: Approaches to the Particularity of Life from a Processual Perspective

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A Process-Based Understanding of Biological Boundaries

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Reconceptualizing the Organism: From Complex Machine to Flowing Stream

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This symposium will report on research deriving form the ERC-funded project, A Process Ontology for Contemporary Biology. Specifically, it will ad-

dress reconceptions of the organism from a processual perspective, stressing the central role of metabolism in defining the organism. The Director of the Project (Dupré) will introduce the project. The first paper (Spann) will discuss philosophical issues arising in providing a process-based account of organism identity, and their implications for the distinction between the living and the non-living. A major implication of a processual perspective on the organism is that boundaries between organisms appear much less objectively determinate than in traditional substance-based accounts. Guttinger will discuss the nature of organismal boundaries in a processual context. Finally Nicholson will describe the ways in which a processual view of the organism diverges from the widely supported idea of the organism as a very complex mechanism.

Levels, Computation, and Causation in Cognitive Neuroscience **Symposium**

Organizer: Jens Harbecke, Vera Hoffmann-Kolss, Marcin Miłkowski & Oron Shagrir
Chair: Alexander Gebharter Room 5E, Thursday 13:00 – 15:00

Level Distinctions and Methods for Constitutive Inference in Cognitive Neuroscience

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Computations, Mechanisms, and the Role of the Environment

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Causal Relations in Mechanistic Explanations

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The False Dichotomy between Causal Realization and Semantic Computation

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The philosophy of cognitive neuroscience is one of the most vividly debated areas of contemporary philosophy of science. A question that has attracted much attention, especially in the past ten years, is how we should understand the various kinds of level distinctions occurring in theories of neuroscientific explanation. The aim of this symposium is to explore the various notions of levels in cognitive neuroscience with a two-fold focus on levels of computation on the one hand, and on causality in multi-level mechanistic explanations on the other hand.

Historical, Social and Cultural Studies in Philosophy of Science I **Contributed Papers**
Chair: Vasso Kindi Room 5G, Thursday 13:00 – 15:00

Social Exclusion despite Methodological Criteria: On Biases in Scientific Quality Evaluation

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Empirical studies show that academia is socially exclusive. I'll argue that this social exclusion works, at least partly, through scientific exclusion, i.e.

through the systematic methodological disqualification of contributions from members of underrepresented social groups. As methodological quality criteria are underdetermined their interpretation and weighing can be biased with relation to gender, race, social background, etc. This can take place on a local or global level. I'll illuminate this by the current situation of women in philosophy, and will conclude that only mechanical solutions can effectively change the situation.

Self-Evidence in Scientific Practice

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Praised widely for its emphasis on experimentation, Ian Hacking's philosophy of science has been criticised on the grounds that it cannot account for epistemic justification. In this presentation I reconstruct Hacking's argument for his brand of scientific realism (entity realism), showing that his famous dictum "if you can spray electrons, then they are real" is a self-evident proposition hinging on his notion of six scientific styles of thinking and doing. I conclude that Hacking's philosophy provides a framework which includes epistemic justification.

Measurement Theory from the Viewpoint of Practical Realism on the Example of the Periodic Table of Chemical Elements

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In measurement theory, measurement is the process of assigning numbers to matter. Physical sciences mostly rely on representational measurement, mapping real properties of objects (empirical relational system, ERS) into an arithmetic of numbers (numerical relational system, NRS); social sciences rely more on pragmatic measurement, guided by pragmatic goals, NRS not representing real objects and relations. Using the periodic table of chemical

elements as example, and practical realism as philosophical framework, I show that 1) objects making up ERS are abstract, not real world concrete objects, 2) material procedural basis of measurement is fundamental for the possibility of systematisation, 3) a measurement system consists not only of ERS and NRS, but also of the material basis and theoretical and metaphysical presuppositions about it and 4) therefore discerning representational from pragmatic measurement in physical sciences is not straightforward.

Local Ontologies and the Integration of Indigenous Knowledge

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The integration of indigenous and scientific knowledge is a widely discussed topic in ethnobiology that has not received sufficient attention in philosophy of science. I propose a model of knowledge integration and of integration limits that reflect the local stability of clustered properties. I argue that the limits of knowledge integration are best understood as creating normative and not metaphysical problems. Two knowledge systems that refer to different property clusters may be metaphysically integrated in a broader framework but this does not solve the normative question what type of knowledge should guide actions in local environments.

Philosophy of the Natural Sciences II **Contributed Papers**
Chair: Alastair Wilson Room 5F, Thursday 13:00 – 15:00

Reaction Mechanisms in Chemistry: A Comparison Case for Accounts of Scientific Explanation

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This paper examines a scientific context in which appeal to mechanisms is arguably as central as it is in biological contexts but which has received much less attention: explanatory patterns involving reaction mechanisms in organic chemistry. The paper has two fundamental aims: to develop a characterization of mechanisms in chemistry as a comparison case for existing analyses of mechanism in the biological sciences, and to use this comparison to highlight certain aspects of explanatory practice across the sciences. The paper offers a general characterization of reaction mechanisms and their role in organic chemistry. From this characterization, I argue that mechanistic explanations in chemistry differ in important respects from their counterparts in biology. Finally, I suggest the distinct character of chemical mechanistic explanations depend on the synthetic aims of organic chemistry and conclude with brief comments about connections between explanation and aims generally.

A Dispositionalist Theory of Laws – Without Dispositions

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According to strong dispositional theories as dispositional monism (Bird 2007), laws of nature are metaphysically necessary. Since this would lead to a severe tension with the methodological practice of physics, I plea for a more sparse metaphysics of laws, called methodological dispositionalism (MD). Similar to the DTA-approach (Armstrong 1997), MD holds laws to be

constituted by contingent causal relations between properties, while in contrast to DTA, it denies that those relations are necessitating. Instead, MD takes facts of irresistible production by fundamental properties – causal contributions of one property will not interfered with by other properties – to be primitive facts about our world.

Unitary Inequivalence in Classical Systems

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Ruetsche (2011) argues that a problem of unitarily inequivalent representations arises in quantum theories with infinitely many degrees of freedom. I provide an algebraic formulation of classical field theories and show that unitarily inequivalent representations arise there as well. I argue that the classical case helps us rule out one possible response to the problem of unitarily inequivalent representations called Hilbert Space Conservatism.

Reconceptualising Equilibrium in Boltzmannian Statistical Mechanics and Characterising its Existence

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In Boltzmannian statistical mechanics the state space is partitioned into macroscopically indistinguishable regions. The largest of these is singled out as the equilibrium region. What justifies this association? We review the answers to this question and find them wanting. We propose a new conception of equilibrium and prove a general theorem which establishes that the equilibrium macro-region is the largest region. We then turn to the question of the approach to equilibrium, of which there exists no satisfactory answer so far. We prove another general theorem providing necessary and sufficient conditions for the approach to equilibrium to take place. This theorem

changes the way in which the question of the approach to equilibrium should be discussed: rather than searching for a crucial factor (e.g. ergodicity or typicality), the focus should be on finding triplets of macro-variables, dynamical conditions, and effective state spaces that satisfy the conditions of the theorem.

General Philosophy of Science III **Contributed Papers**
Chair: Richard David Rus Room 5H, Thursday 13:00 – 15:00

Causal-Possibility Explanations

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In this paper we articulate a form of causal explanation that is modal, not ontic. We label this form of explanation causal-possibility explanation. By arguing for causal-possibility (C-P) explanations, we are going against the spirit (if not the letter) of the classic, long-received treatment of scientific explanation by Salmon. In challenging this received view, we suggest that not all modal explanations are non-causal. And not all causal explanations are ontic. To motivate this position, we offer examples of C-P explanations and show why they are both modal and causal. We then explore how C-P explanation squares with similar positions in the literature. And we conclude by discussing recent accounts of non-causal modal explanation and how they relate to our account.

Scientific Realism as a Pragmatic Attitude

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The decision whether to have a realist or an instrumentalist attitude towards scientific hypotheses is interpreted in this paper as a choice that scientists

themselves have to face, rather than as a philosophical problem. This decision will be justified by pragmatic reasons, and I shall discuss it with the help of two different conceptual tools: a deflationary semantics grounded in the inferentialist approach to linguistic practices developed by some authors (e.g., Sellars, Brandom), and an epistemic utility function that tries to represent the cognitive preferences of scientists. The first tool is applied to two different questions traditionally related to the problem of scientific realism: the non-miracle argument, and the continuity of reference. The second one is applied to the problem of unconceived alternatives, and to the distinction between realism and instrumentalism.

Mathematical Evidence: Pure vs Applied

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Philosophers distinguish pure from applied mathematics by saying that pure involves only mathematical concepts, while applied uses a mixture of mathematical and non-mathematical notions. Mathematicians cite examples loaded with physics and nevertheless call them pure. Why this difference? Philosophers are motivated by epistemology; mathematicians draw their distinction based on whether the mathematics is interesting. I develop a pure-applied distinction in ethics for purposes of epistemic comparison and conclude that in some cases we should look to ethics as a model for mathematical knowledge. Just as thought experiments, for example, can work in ethical reasoning, they can also work in mathematical practice. I will illustrate this claim with examples.

Absolute Measures of Effectiveness

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Many 'outcome measures' are employed in clinical research. An outcome measure is an abstract formal statement describing a relation between the value of the measurand in the control group and the value of the measurand in the experimental group. When particular substantive values for such measurands are substituted into an outcome measure, the result is a quantitative estimation of the strength of an alleged causal relation—this quantity is usually called an 'effect size'. The results of clinical research are frequently reported with 'relative' outcome measures and 'absolute' measures are often neglected. Here I argue that relative measures promote the base-rate fallacy. Thanks to the work of Kahneman and Tversky and others, we know that people reason poorly with prior probabilities. Therefore, since absolute measures take into account prior probabilities, whereas relative measures do not, absolute measures should always be reported.

Symposia & Contributed Papers IV

Émile Du Châtelet's Institutions de Physique **Symposium**
Organizer: John A. Hanson
Chair: Nina Retzlaff Room 5F, Thursday 15:30 – 17:30

Émilie du Châtelet on Newtonian Attraction

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Du Châtelet's Philosophy of Space and Time

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Du Châtelet on the Law of Continuity

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PSR and the Problem of Force: The Metaphysical Grounding of Physics in Du Châtelet and Wolff

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Substance and Change in the Institutions de Physique

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In her 1740 book, Institutions de Physique, Émilie du Châtelet attempted an ambitious synthesis of Newtonian physical ideas with the metaphysics of Leibniz and Wolff. In spite of its many merits, the Institutions remains largely unknown today. To remedy this situation, our group has translated this work into English. This symposium presents our research on this text. Our talks will concern du Châtelet's ontology, her account of space, time, the continuum, scientific methodology, and her critique of Newtonian gravitation. These presentations should be of interest to historians, philosophers of science, and those interested in the role of women in science.

Social Norms Across Disciplines **Symposium**
Organizer: Chiara Lisciandra
Chair: Alexander Christian Room 5E, Thursday 15:30 – 17:30

Norm Compliance and Humeanism. A Neurocomputational Account

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Insult versus Accident: Caste Culture and the Efficiency of Coordination

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Modelling Norms

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The literature at the intersection of economics, psychology and philosophy is animated by a debate as to how better to formulate models of individual behavior in interactive contexts. According to behavioral economists and psychologists, economic models should be enriched with psychological parameters that will more plausibly characterize the factors that influence individual decision-making. Yet the formulation of more realistic psycho-economic models is proposed in a variety of ways. Criteria of legitimacy are often not made explicit. One of the two main aims of this symposium will be to clarify the sense in which more realistic yet predictive models should be built in economics. The other is to examine the implications of this project for the provision of new methodological tools to measure socio-normative behavior.

Philosophy of the Life Sciences II **Contributed Papers**
Chair: Alan Love Room 5D, Thursday 15:30 – 17:30

Disease-Mongering through Clinical Trials

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Our goal in this paper is to articulate a precise concept of at least a certain kind of disease-mongering, showing how pharmaceutical marketing can

commercially exploit certain diseases when their best definition is given through the success of a treatment in a clinical trial. We distinguish two types of disease-mongering according to the way they exploit the definition of the trial population for marketing purposes. We argue that behind these two forms of disease-mongering there are two well-known problems in the statistical methodology of clinical trials (the reference class problem and the distinction between statistical and clinical significance). Overcoming them is far from simple.

Convergent Perspectivism

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This paper articulates convergent perspectivism as an account of experimental neurobiology that makes sense of the multiplicity of different experimental protocols for the study of presumably identical phenomena employed in the field. The thesis is that such multiplicity is necessary under considerations for the validity of animal models which are the main experimental tool in the field. Animal models in neurobiology are used as representational models in which the experimental animals serve as proxies for humans. Their representational validity is established through a validation strategy which requires the results of multiple integrated experiments aiming at explaining identical phenomena to converge.

Extended Inheritance as Persisting Extended Organization

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This paper proposes an organizational perspective on extended inheritance. Based on theoretical studies on biological organization and extended physiology, such a perspective allows thinking about diversified biological legacies – including genetic and non-genetic determinants – while maintaining a theoretically indispensable distinction between biological systems and their environment. In this context, inherited determinants share the property of being organizational constraints, harnessing flows of matter and energy across generations of composite biological systems. The line of demarcation between these systems and their environment is modelled on an organizational criterion, and on the related conceptual distinction between persisting constraints and stable resources. Extended inheritance, as for it, is defined as persisting extended organization. The case of symbiotic transmission is presented as a paradigmatic system for the outlined organizational perspective.

Natural Selection: Deriving Causality from Equilibrium

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It is an ongoing controversy whether natural selection is causal, or a mere statistical description of how individual births and deaths accumulate. In this paper I outline a middle way, in between statisticalist and causalist approaches to natural selection, by adopting statisticalist analysis while yet showing how causalist intuitions could be legitimate. Borrowing the notion of equilibrium from complex dynamics, one can precisely define how a statistical process such as population change can be directional and have magnitude. Explanation by natural selection abstracts away from detail at the

level of individual organisms, and to a certain extent its probabilistic nature is a result of (deliberately) ignoring much detail at the individual level. However, more importantly it reveals an objective feature of certain evolutionary processes, namely the presence of stable equilibrium. Natural selection is a causal propensity because it causes evolution towards stable equilibrium.

General Philosophy of Science IV **Contributed Papers**
Chair: Jaakko Kuorikoski Room 5G, Thursday 15:30 – 17:30

In Defense of Historical Theories of Confirmation

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First, I shall try exemplarily to show that basically all major participants in the present debate - advocates and critics of predictivism alike - accept and rely on logical approaches to confirmation. Secondly, I shall consider the main reasons for this preference for logical theories, and shall propose that partly the arguments beg the question, partly the cogency of the arguments is disputable or unsettled. Finally, I shall discuss the prospects of historical theories of confirmation from a pragmatist point of view and conclude that these are not as counter-intuitive as they are widely believed to be.

From Zymes to Germs: Discarding the Realist/Antirealist Framework

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I argue that neither realist nor anti-realist accounts of theory-change can account for the transition from zymotic views of disease to germ views. The trouble with realism is its focus on stable and continuous elements that get retained in the transition from one theory to the next; the trouble with anti-

realism is its focus on the radical discontinuity between theories and their successors. I show that neither of these approaches works for the transition from zymes to germs: there is neither realist continuity nor anti-realist discontinuity, but, instead, a gradual evolution from zyme to germ views, during which germ elements are slowly incorporated into zymotic views until, eventually, none of the original zymotic constituents are left. I argue that the problem with both realism and anti-realism is that they rest on the assumption that there are well-delineated theories that can be compared and assessed on terms set by the realism-debate, an assumption that does not hold here.

The Gap Between Psychological Explanation and Mechanistic Explanation

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Mechanistic explanation proceeds by describing the parts, operations, and the organized functioning of the ontic structures that are responsible for the explanandum phenomenon in question. According to the New Mechanists, psychological explanation should likewise proceed by describing the relevant neural and biochemical mechanisms responsible for psychological phenomena. In this paper, I demonstrate ways in which mechanistic explanation isn't sufficient for explaining psychological phenomena. I then develop a view according to which scientifically explaining psychological phenomena requires different varieties of explanations (including mechanistic explanation), each of which explains a different aspect of the relevant phenomena. I conclude by suggesting that scientific explanation in general might be understood as an orchestrated activity of many different explanations that target different facets of the explanandum phenomenon.

Measurements, Coordination, and the Problem of Representation of Physical Quantities

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In his Scientific Representation, van Fraassen argues that measuring is a form of representation. In fact, every measurement pinpoints its target in accordance with specific operational rules within an already-constructed theoretical space, in which conceptual interconnections can be represented. Reichenbach's 1920 account of coordination is particularly interesting in this connection. In his early work, however, the idea of coordination was employed not only to indicate theory-specific fundamental principles such as the ones suggested by Friedman's relativized a priori, but also to refer to more basic principles. These are preconditions both of the individuation of physical magnitudes and of their measurement, thus necessary to approach the world through measurement in the first instance. This paper aims to reassess Reichenbach's approach to coordination and to the representation of physical quantities in light of recent literature on measurement and scientific representation.

Formal Approaches to Philosophy of Science II **Contributed Papers**
Chair: Gerhard Schurz Room 5H, Thursday 15:30 – 17:30

Interventions at the Core of Scientific Reasoning – On De-Idealizing and Re-Idealizing Formal Logic

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Can a logic be constructed which is more in accordance with the actual patterns of reasoning found in science? In the first part of the paper, I consider

the prospects of a de-idealization of logic. I analyze the construction of patterns of reasoning as objects for logical enquiry as a process of preparation involving delimitation, abstraction and idealization of said objects. Awareness of this process provides possibilities for intervention with the simple terms at the core of logic, potentially closing the gap between normative and descriptive aspects of reasoning. I argue against using the term naturalization for such an intervention. One reason for this is that a de-idealization of logic must be followed by a subsequent re-idealization keeping in mind that the goal of logic is to establish patterns of correct reasoning. In the second part of the paper, I outline a specific suggestion for a re-idealization of logic taking into account recent studies of scientific reasoning.

A Logic for the Discovery of Causal Regularities

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We present a qualitative (non-probabilistic) logic for the discovery of deterministic causal regularities starting from empirical data. Our approach is inspired by Mackie's theory of causes as inus-conditions and makes use of the adaptive logics framework. Our knowledge of deterministic causal regularities is, as Mackie noted, most often gappy or elliptical. The adaptive logics framework is well-suited to explicate both the internal and the external dynamics of the discovery of such gappy regularities. After presenting our logic, we consider some criticisms of the inus-account and how they affect our approach; we compare our logic with a recent algorithm for the discovery of deterministic causal regularities by Michael Baumgartner; and we situate our logic within existing formal approaches to inductive and abductive reasoning.

A Resiliency-Based Approach to Chance

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We show how a particular resiliency-centered approach to chance provides a justification for two conditions that are claimed in the literature to be constitutive of chance. The first condition tells us that the present chance of some proposition A conditional on the proposition about some later chance of A should be set equal to that later chance of A. The second condition requires the present chance of A to be equal to the weighted average of possible later chances of A. In this paper we first introduce, motivate and make precise a resiliency-centered approach to chance whose basic idea is that any chance distribution should be maximally invariant under variation of experimental factors. Second, we provide resiliency-based arguments for the two conditions: we show that any chance distribution that violates the two conditions can be replaced by another chance distribution which is more resilient under variation of experimental factors.

On the Preference for more Specific Reference Classes

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In attempting to form rational personal probabilities by direct inference, it is usually *assumed* that one should prefer frequency information for more specific reference classes. While this assumption is intuitively plausible, little energy has been expended in explaining why it should be accepted. I address this lacuna by showing that, among the principled policies that may be used in setting one's personal probabilities, the policy of making direct inferences using frequency information for the most specific applicable reference classes yields personal probabilities whose accuracy is optimal, according to all

proper scoring rules, in all situations where all of the relevant frequency information is *point-valued*. Time permitted, I address the further dilemma of choosing between direct inference based upon relatively precise-valued frequency information for a reference class, R, or upon relatively imprecise-valued frequency information for a more specific reference class, R'.

Symposia & Contributed Papers V

Newman's Objections to Structural Realism: New Approaches **Symposium**
Organizer: Thomas Meier & Sebastian Lutz
Chair: Christian J. Feldbacher Room 5D, Friday 09:30 – 11:30

Overcoming Newman's Objection

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The Newman Problem and Ontic Structural Realism

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Newman's Objection is Dead, Long Live Newman's Objection!

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A Carnapian Answer to Newman

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Russell's Response to Newman: Space-Time Structuralism

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Structural realism claims the ontological or epistemological primacy of relations over their relata. It has played an important historical role in philosophy and the philosophy of science and is if anything more influential in current debates about scientific knowledge. Unfortunately, Max Newman formulated an objection to Russell's structural realism that is often taken to show that all forms of structural realism are trivial. It is the aim of this symposium to provide precise accounts of structural realism that avoid Newman's objection.

How is Reduction Achieved? **Symposium**
Organizer: Gergely Kertész
Chair: Vera Hoffmann-Kolss Room 5F, Friday 09:30 – 11:30

Reductive Explanation and Hypothetical Identities

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Mechanisms and Reduction in Chemistry

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Mechanisms and Reduction in Psychiatry - An Interventionist Perspective

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"Nothing-over-and-above-ness" without Reduction

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Autonomy, Multiple Realization and the Way Reduction is Done

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In our planned symposium we would like to discuss issues concerning mechanistic-functional explanations. Our aim is to discuss mechanistic reduction in different sciences, reconstruct its methodology and the implicit metaphysical commitments of its practice. We would like to focus on two main issues. Firstly, the status and role of identity statements in reduction in general and mechanistic reductions in particular. Secondly, the issue concerning the autonomy of higher levels and higher level explanations in the context of mechanistic reduction. The latter discussion will concentrate on pluralistic explanations and the relationship between multiple realizability and mechanistic explanations.

Philosophy of Cognitive Sciences II **Contributed Papers**
Chair: Lilia Gurova Room 5E, Friday 09:30 – 11:30

Is Episodic Memory a Natural Kind?

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Colloquially, episodic memory is described as "the memory of personally experienced events". We ask how episodic memory should be characterized in order to count as a natural kind. We conceive of episodic memory as a knowledge-like state identifiable with an experientially based mnemonic representation of an episode that allows for a mnemonic simulation. Aiming for a uniform underlying causal mechanisms for episodic memory, we argue that episodic memory is a natural kind along three cornerstones: 1) Psychological evidence suggests that a violation of any of the conditions for episodic memory amounts to a deficiency of episodic memory and no form of memory or cognitive process but episodic memory fulfills them. 2) Empirical results support a claim that the principal anatomical substrate of episodic memory is the hippocampus. 3) We can pin down causal mechanisms onto neural activities in the hippocampus to explain the psychological states and processes constituting episodic memory.

Scientific Competition and Its Threat to a Neuroscience of Consciousness

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If SC is a mark of scientificality, then the search for the neural correlate of consciousness (NCC) is no science: The accepted notion of an NCC provided by David Chalmers (2000) as that neural state that is minimally sufficient (but not necessary) for some conscious state prohibits SC. I elucidate this with a comparison of Lamme's Recursive-Processing-Theory (2005, 2006)

and Tononi's Integrated-Information-Theory (2008, 2011). Both seem to compete, but cannot given Chalmers's definition.

On the Plurality of Explanations in the Cognitive Sciences

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Over the last decades "Radical Embodied Cognition" has attracted a growing consensus in theoretical and experimental cognitive science. According to this view, symbolic and computational approaches to mental phenomena are mistaken, whereas cognition is best studied by adopting methodological tools from Dynamical Systems Theory. Contrary to this opinion, I argue that an informational approach to cognitive explanation has substantial merits that cannot be ignored. In order to support this claim, an abductive analysis is provided, and a pluralistic approach to cognitive explanation is defended.

What are Phenomena in the Cognitive and Behavioral Sciences?

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Within the philosophy of neuroscience, it is common to refer to the objects of explanation/discovery as phenomena. This notion is often contrasted with mechanisms. Typical questions are whether phenomena can be explained by appeal to underlying mechanisms and whether the discovery of mechanisms is guided by descriptions of phenomena (and vice versa). By contrast, within general philosophy of science, the notion of phenomena has been juxtaposed with that of scientific data, where the former are characterized by their context-independence, whereas the latter are characterized by their context-specific characteristics. I will argue that the rather narrow focus on mechanisms as well as the rather lose usage of the term "phenomenon" in recent philosophy of neuroscience have obscured some important

philosophical questions with respect to the objects and methods of experimental cognitive science more broadly conceived.

Philosophy of the Natural Sciences III **Contributed Papers**
Chair: Andreas Bartels Room 5G, Friday 09:30 – 11:30

Classical Limit of a (Macroscopic) Particle in a Box. A Suggested Solution to Einstein's Objection to Bohm's Theory (cancelled)

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In 1953, Einstein adresses a subtle objection to Bohm's theory. The argument is the following: let's describe a simple model of a quantum (macroscopic) particle in a box and search for the classical limit of that system, i.e., a particle that moves to and fro between the walls of the box. According to Bohm's theory, the velocity is zero in each point of the box, that is, the particle is always at rest. A very non-classical situation. Thus -Einstein concludes- Bohm's theory does not provide "the real description of an individual system".

The paper deals with Einstein's objection to Bohm's theory and aims to propose a solution of the problem.

In a realistic description of the classical limit, a macroscopic particle in a box is not isolated, but interacts with an external environment. So, we shall propose a simple model of Bohmian decoherence, evaluating whether, in this new framework, the Bohmian particle assumes a definite velocity, approaching the classical value in the limit.

On the Epistemic Interpretation of Quantum Mechanics

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The status of state descriptions in quantum mechanics (QM) has always been heavily debated. At any given time QM only assigns definite values to a limited subset of measurable physical magnitudes. The QM measurement process leads to the possibility of cats being 'dead and alive at the same time'. Some have hence urged to interpret QM in terms of knowledge. This view has recently become fashionable again. Harrigan and Spekkens (2010) have developed a formal framework for construing quantum states in this way. They attempt to reproduce quantum statistics from probability distributions over true states. In epistemic models, true states appear as hidden variables, which must be nonlocal (Bell, 1964). Spekkens (2007) and Bartlett et al. (2012) have developed models that seem to reproduce part of QM locally. Building on Hardy (2013) and Reeh and Schlieder (1961), I argue that nonlocal elements do have to be assumed, which undermines the apparent success.

Cosmological Probabilities: General Relativity and Statistical Mechanics Writ Large

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Physicists and philosophers have occasionally advanced arguments concerning the probabilities of possible universes, based on, for example, the so-called Past Hypothesis and Gibbons-Hawking-Stewart measure from cosmology. Although it may seem dubious to treat the entire universe as a random event, one might suppose that these arguments may be justified by

extrapolating successful applications of probability in physics, such as statistical mechanics, to the universe. I argue that these justifications, when based on statistical mechanical probabilities fail.

Typicality in Multiverse Cosmology

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I investigate the principle that we are 'typical' in top-down, anthropic, multiverse scenarios. I argue that in extracting predictions in these scenarios from likelihoods for observables, we cannot assume typicality, nor can we ignore it. I show in an example related to dark matter, that typicality dramatically affects predictions, exemplifying how errors in reasoning about typicality translate to errors in the assessment of predictive power.

Furthermore, I quantitatively assess this principle by employing 'xerographic distributions' (XDs) to encode typicality assumptions. I find for a fixed theory, this principle generates higher likelihoods for our observations, but if both the theory and the assumption of typicality vary, it does not always generate the highest likelihoods. From a Bayesian viewpoint, one should thereby infer how typical we are from the theory and XD that together, maximize the posterior probability. The principle is thus more questionable than has been claimed.

Historical, Social and Cultural Studies in Philosophy of Science II — **Contributed Papers**
Chair: Antonios Basoukos — Room 5H, Friday 09:30 – 11:30

The Objectivity of the Humanities: Hempel, Carnap and the Case of Lucien Febvre

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In this paper I discuss two different views on the objectivity of the humanities (Geisteswissenschaften): the verificationist view of Carl Hempel and the structuralist view of Rudolf Carnap. I show that both positions try to answer a problem within the theory of the humanities, namely the method of "Verstehen". I argue that the structuralist position fares better than the verificationist when they are applied to a typical example of research in the humanities, namely the discussion of Rabelais's supposed atheism in Lucien Febvre's "Le problème de l'incroyance au XVIe siècle". The verificationist view cannot account for Febvre's better reading of the 16th century texts compared to his predecessors. The structuralist position, however, can relate Febvre's reading to a richer conceptual structure and thus shows how Febvre has a more objective understanding of the texts.

On the Role of Political Science Research in Philosophy of Science

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Recent philosophy of science is characterised by considerable interest towards the social aspects of science; some accounts also make proposals about changes to be made in the way science is organised and governed. The aim of my presentation is to explore what role research in political science and science policy analyses could play in such a proposal.

Philip Kitcher has recently suggested that research in political science could provide tools to improve democratic deliberation while philosophical proposals such as Kitcher's "well-ordered science" show where to employ them. I challenge Kitcher's assumption about the possibility of universal political know-how, drawing on Sheila Jasanoff's comparative analyses of biotechnology policy. I argue that research in this area is best seen as the source of information about context-specific forms of democracy and I discuss some proposals about politically relevant philosophy of science as a model for philosophical engagement with them.

Well-being Intuitionism and Conceptual Adequacy in Well-being Science

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Different approaches to welfare measurement in economics and other social sciences do not only differ in terms of measurement procedures, but also employ different conceptions of well-being. How do we know which one of these has a better understanding of well-being? Anna Alexandrova (2012a, 2012b, 2014) has argued that the appropriate axiological standards for well-being science do not come from a theory in philosophy, because of the lack of a unifying philosophical account and because the current accounts are unhelpfully context-independent. I argue that the reason philosophy cannot play this role is not context-dependency, but different conceptual demands in science and philosophy. I argue that we can assess value adequacy on the shared pre-theoretical basis of intuitions of philosophical well-being theories. I spell out a methodology to arrive at a robust basis of pre-theoretical intuitions by means of a reflective equilibrium, and derive a number of practical criteria.

The Law of Continuity, Determinateness, and the Mathematizability of Nature: Boscovich and his Contemporaries

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The law of continuity is well-known as a fundamental principle in Leibniz' metaphysics. A version of Leibniz' law of continuity played a central role in

eighteenth century physics. In this paper, I discuss the role of the law of continuity in the work of Johann Bernoulli, Emilie Du Châtelet, and Roger Boscovich, around the mid-eighteenth century. I argue that for them, the law of continuity implied a correspondence between nature and mathematics, which made a mathematical treatment of nature possible. They provided arguments for the universal validity of the law of continuity in both natural processes and geometry.

However, they ran into problems when confronted with developments within mathematics, specifically the possibility of discontinuous geometrical curves. This undermined the argument of continuity in nature based on a correspondence with mathematics, and showed that the mathematizability of nature could not be based on such strict argumentation.

Symposia & Contributed Papers VI

Science within Metaphysics and Metaphysics within Science: Articulating the Relationship between Metaphysics of Science and Traditional Metaphysics Symposium

Organizer: Thomas Pradeu

Chair: Juha Saatsi Room 5D, Friday 13:00 – 15:00

Metaphysics and Science: Rationalism and Empiricism

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Building Bridges with the Right Tools: Modality and the Standard Model

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Situating Metaphysics of Science: Back to Square One

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Are the Questions of Metaphysics More Fundamental than Those of Science?

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"Metaphysics of science" has become a highly dynamic field, but there are many disagreements on what this label means. We suggest that "metaphys-

ics of science" covers three different research projects: an attempt to replace traditional and analytic metaphysics by a "scientific metaphysics"; an attempt to offer an account of highly general notions supposedly found in all the sciences (e.g., law; causation); an attempt to build a "reflective equilibrium" between traditional metaphysics and metaphysical lessons taken from current science. Our aim is to examine these three projects by clarifying how metaphysics can be used by science, and vice versa. Stepping back from current metaphysical "battlefield", we claim first that metaphysics of science can be built only by people who know the details of both current science and traditional metaphysics, and second that the most productive results are likely to stem from the precise articulation of the inter-relationships between these domains.

Imprecise Probabilities **Symposium**
Organizer: Gregory Wheeler
Chair: Thomas Müller Room 5F, Friday 13:00 – 15:00

The Epistemological Significance of Imprecise Probability

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What do (Im)Precise Credences Represent?

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Reply to Carr and Williamson

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Carr and Williamson's Response

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The history of IP is long but controversial. Savage thought the notion of sets of probabilities unworkable; de Finetti, ill-motivated. These objections and others are advanced by contemporary critics, too. But one thing different is that the mathematical foundations for a wide class of IP models, which have only been in place since (Walley 1991), have been recently greatly simplified and extended (Troffias and De Cooman 2014). Thus, now is the time to give a critical reassessment of the theory of imprecise probabilities.

This proposed symposium will draw together two contemporary critics of imprecise probabilities, Jennifer Carr (Leeds) and Jon Williamson (Kent), and two contemporary defenders, Seamus Bradley (MCMP) and Gregory Wheeler (MCMP).

General Philosophy of Science V **Contributed Papers**
Chair: Raphael Scholl Room 5D, Friday 13:00 – 15:00

Non-causal Features of Topological Explanations: Expending the Notions of Interventions, Counterfactual Dependencies and Difference-makers

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Topological explanations (TE) are based on models that are network idealizations of real systems in which elements are represented as vertices and their interactions as edges. I show that TE are non-causal because causal features of systems may be greatly changed, but changes in macro-scale properties of a system won't occur unless its connectivity features are changed. Explanations that appeal to changes in connectivity are non-

causal, because the interventions are not done on causally relevant variables but on variables that change connectivity. A TE will appeal to the same connectivity difference-makers even in purely abstract networks that don't represent anything, i.e. in networks that are pure mathematical objects where causal features of interactions play no role whatsoever. In this sense the notions of interventions, difference-makers and counterfactual dependencies can be expended to non-causal features of TE.

Abduction and Cultural Evolution

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C. S. Peirce introduced in the 1860s his notion of hypothesis as "inference of a cause from its effect". Later he coined the term abduction for such an "inference to an explanation". Its important special case is retroduction, or reasoning backward in time on the basis of causal laws of succession. Peirce illustrated retroduction by the inference from present documents to the historical existence of Napoleon Bonaparte. This paper shows that similar examples abound in biology and cultural sciences. The reconstruction of the evolutionary tree of life on the basis of present evidence is an abductive task in Peirce's sense. Starting from the 1860s, the idea of evolution was applied in the study of culture (philology, ethnology, anthropology, folkloristic), with the aim of reconstructing family trees of languages and stemmas of texts. The inferential abductive structure of textual criticism and stemmatology in cultural sciences is shown to be similar to cladistics in biological taxonomy.

Causal Probability and Scientific Practice

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I argue that scientific practice often depends on an implicit distinction between what I call "causal probabilities" and other probabilities. Roughly, when we can manipulate frequencies by manipulating the characteristics of a chance setup that determines probabilities' numeric values, the probabilities can be considered causal probabilities. Philosophers often assume that only propensities and closely related kinds of probability have this characteristic. Even if propensities are defensible, it's doubtful that they can play all the roles required by causal probability. Moreover, other causal probability interpretations have been proposed in recent years by Rosenthal, Strevens, and Abrams, among others. I elaborate and clarify the concept of causal probability apart from any particular interpretation of probability, using examples from applied population genetics, and focusing partly on roles played by probabilities in computer simulations and mathematical models.

On the Limits of Causal Modeling: Spatially-Structurally Complex Phenomena

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This paper examines the adequacy of causal graph theory as a tool for modeling biological phenomena and formalizing biological explanations. I point out that the causal graph approach reaches it limits when it comes to modeling biological phenomena that involve complex spatial and structural relations. Using a case study from molecular biology, DNA-binding and -recognition of proteins, I argue that causal graph models fail to adequately represent and explain causal phenomena in this field. The inadequacy of these models is due to their failure to include relevant spatial and structural

information in a way that does not render the model non-explanatory, unmanageable, or inconsistent with basic assumptions of causal graph theory.

Philosophy of the Natural Sciences IV **Contributed Papers**
Chair: Ioannis Votsis Room 5G, Friday 13:00 – 15:00

Einstein's Physical Strategy, Energy Conservation, Symmetries and Stability

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Renn, Janssen et al. have shown that Einstein found his field equations partly by a physical strategy including the Newtonian limit, a Maxwell analogy, and energy conservation. How did he represent energy and why? Since Lagrange and Jacobi linked conservation to symmetries, did Einstein? How did his work relate to the emerging canonical tensor in Herglotz, Mie and Born? After using energy-momentum tensors crafted from field equations, Einstein used an identity from his assumed linear coordinate covariance x^m'= A^m_n x^ to arrive at the canonical tensor. Mie and Born were concerned about asymmetry, but Einstein did not need to be because his Entwurf theory is modelled less on Maxwell than on Newton with a symmetric canonical tensor. The Entwurf has 3 negative-energy degrees of freedom, failing an a priori particle physics stability test with roots in Lagrange's theorem---c.f. Einstein's 1915 critique for not admitting rotating coordinates or getting Mercury right.

Renormalization and Relativity

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I discuss the role of assumptions about relativity in the debate between Doreen Fraser and David Wallace over which formulation of quantum field

theory ought to be the basis of philosophical interpretation. I contend that we can make sense of Wallace's claim that effective field theories which break Relativistic space-time symmetries by imposing a cuttoff can be viewed as approximately Poincaré covariant at low energies. The question is then, why should we demand fundamental Poincaré covariance when investigating what quantum field theory tells us about the world? One reason might be that special relativistic space-time structure is taken to be indispensable in explaining some phenomena. While this claim seems to be supported by some philosophers of physics I suggest that it is problematic.

What Explains the Spin-Statistics Connection?

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The spin-statistics connection (SSC) plays an essential role in explanations of a wide range of non-relativistic quantum phenomena such as the electronic structure of solids and the behavior of Einstein-Bose condensates, superconductors, and white dwarf stars, among other things. However, it is only derivable in the context of relativistic quantum field theories (RQFTs) in the form of the Spin-Statistics theorem; and there are mutually incompatible ways of deriving it. This essay considers the sense in which SSC is an essential property in RQFTs, and how it is that an essential property in one type of theory can appear in fundamental explanations offered by other, inherently distinct theories.

Macroscopic Oil Droplets Mimicking Quantum Behavior: How Far can we Push an Analogy?

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We describe here a series of experimental analogies between fluid mechanics and quantum mechanics recently discovered by a team of physicists. We argue that these experimental facts put ancient theoretical work by Madelung on the analogy between fluid and quantum mechanics into new light. We place these analogies in their historic and philosophical context, relating them to the de Broglie-Bohm interpretation of quantum mechanics. Finally we point out a distinctive advantage of the 'fluid-mechanical' interpretation of quantum mechanics over the Bohm interpretation: Madelung's interpretation may rid Bohm's theory of its strongly non-local character.

Philosophy of the Life Sciences III **Contributed Papers**
Chair: Ulrich Stegmann Room 5H, Friday 13:00 – 15:00

Species Concepts as Tools

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I sharpen modern accounts of species pluralism by exploring the `species concepts as tools' metaphor on the basis of a case study in yeast systematics. A species pluralist may rule out certain species concepts as unsuitable for systematic work by the lights of biological theory, but my aim is to be more discerning. Species pluralists understand that different concepts work well for different areas of biology, but this remains unexplored. Rather than ask on what grounds a concept is legitimate by the light of biological theory, one ought to ask how species concepts are used. This involves exploring when concepts are used well or misused. For example, the biological species

concept (BSC) would be used well for sexual organisms, would not be used at all with respect to asexual organisms, but how might it be used for groups of organisms that straddle the divide between sexual and asexual organisms? These sorts of questions remain unanswered by current versions of species pluralism.

Squaring the Circle? Assessing Mechanistic Constitution With Interventions

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Proponents of mechanistic explanations suggest there to be a constitutive relevance relation between the phenomenon to be explained and the components of its mechanism. This constitutive relation can be assessed by means of interventions. First, this view creates a conceptual problem: interventions are designed for detecting causal relations while constitutive relevance is explicitly described as non-causal. So can we use interventions to assess constitutive relations? Second, there is an empirical challenge: How can we experimentally distinguish between causal and constitutive relations? Recently, Gebharter & Baumgartner (2015) have suggested a solution to the conceptual problem and an answer to the empirical challenge. However, their treatment of the latter remains unsatisfying. In this paper, we suggest a different way to meet the empirical challenge that is based on different solutions to the conceptual problem.

Establishing Constitutional Relations, in Theory and in Practice

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In this paper, we argue that Craver's (2007) mutual manipulability criterion for the identification of the (micro) constituents of a (macro) phenomenon

is inadequate, both normatively and descriptively, and we offer an 'abductivist' alternative. According to our proposal, constitutional relations are established by finding a decomposition of the phenomenon into causally interacting parts that provides a maximally explanatory account of that phenomenon. Selecting a best explanation, in turn, involves satisfying a number of constraints, which jointly guarantee redundancy-free empirical adequacy and decompositional robustness. Our proposal is distilled from recent research in neuroscience concerned with the identification of constitutional relations in the brain. We claim that our account not only provides a faithful reconstruction of the scientific reasoning involved in these examples but also lays the foundation for a normatively adequate methodology of constitutional reasoning.

Against the Grain: An Investigative Model for the Ancestral Health Movement

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The ancestral health movement (AHM) attempts to integrate concepts from evolutionary biology into the health sciences, in e.g. evolutionary medicine or the "Paleo diet". The AHM looks to evolutionary biology not only to develop hypotheses about the causes of human health outcomes, but also to develop recommendations for health interventions. Critics have characterized the AHM as making vague and inaccurate claims about human behavior and health outcomes. I discuss six questions which the AHM must answer to achieve its explanatory and interventionist goals in relation to one of its central claims: many negative human health outcomes are the consequence of a mismatch between contemporary human environments and the evolved physiology of the human organism.

I propose a model for investigating the claims of the AHM which will simplify the discussion for the advocate and the skeptic alike by clarifying the disputed claims and providing a rubric by which each can evaluate the AHM.

Symposia & Contributed Papers VII

Physics and the Nature of Computation **Symposium**
Organizer: Chris Timpson & Owen Maroney
Chair: Karim Thebault Room 5G, Friday 15:30 – 17:30

Is Information Physical?

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When does a Physical System Compute?

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The Mechanistic View of Computation and Quantum Computers

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This symposium brings together some of the leading researchers in physics, and in philosophy of physics, who are trying to understand the nature of computation at the fundamental level. Our topics range from pressing practical and technical physics issues in the theory and Experiment Of Quantum Information Processing Devices, Via Questions Of What The Ultimate limits of physical computation might be, to the assessment of novel, bold metaphysical claims about the underlying computational or informational nature of physical reality. A core question will be what it takes for a physical process to count as instantiating a computational process. A range of alternate general answers to this question will be given and their respective merits as-

sessed. En route, trivialisation results as of Searle and Putnam will be discussed. Further topics addressed will include non-standard models of computation, the source of quantum-computational speed-up, and computational realism.

Situated Cognition and Scientific Practice **Symposium**
Organizer: Adam Toon & Sabina Leonelli
Chair: Markus Werning Room 5F, Friday 15:30 – 17:30

Empiricism for Cyborgs

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Building Computational Representations for Scientific Discovery: A Distributed Cognition Account

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Distributed Reasoning in Data-Centric Science

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Hardwig's Dilemma and a Hidden Individualism in Social Theories of Scientific Knowledge (cancelled)

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Active Externalism, Virtue Reliabilism and Scientific Knowledge

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Situated cognition is a growing movement in cognitive science that rejects the traditional view of cognition as something that happens inside the head. Instead, cognition is seen to depend on interaction between the brain, body and environment. Situated cognition offers a promising framework for studying scientific practice, where reasoning relies heavily on instruments, tools and social institutions. And yet it also challenges widespread assumptions about the nature of knowledge and its production. This symposium brings together a range of different perspectives – from cognitive science to social epistemology – to explore the implications of situated cognition for our understanding of scientific practice.

Formal Approaches to Philosophy of Science III **Contributed Papers**
Chair: Paul Thorn Room 5D, Friday 15:30 – 17:30

Relative Modalities and Chance

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'Chance' is arguably a context-sensitive expression, a fact some have thought bears upon the debate about determinism's compatibility with objective, non-trivial chances (chances with values other than 0 or 1). Eagle (2011) defends the possibility of deterministic chance by claiming that the context sensitivity of 'chance' allows true 'chance' statements to be made even in deterministic worlds (where such statements require objective chances to ground their truth). I argue against the view that the context sensitivity of 'chance' bears upon debates about the compatibility of objective chances with determinism. The semantic theory required to move us from

the context sensitivity of 'chance' to substantive conclusions about the compatibility of objective chances with determinism is one we have independent reason to reject. If we make the necessary modifications to our semantic theory, compatibilism about determinism and objective chances follows only, if at all, with great difficulty.

Communism and the Incentive to Share in Science

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Merton's "communist norm" requires scientists to share their work widely. Strevens has recently argued that the communist norm has the structure of a Prisoner's Dilemma: even though sharing is good for all, it is in a rational credit-maximizing scientist's interest to deviate from the norm. He offers a social contract explanation of why the norm persists in spite of this fact. Against this, I use a game-theoretic model to show that sharing is in the individual scientist's interest. It follows that the communist norm requires no special explanation. I also offer replies to Strevens' objections to this approach.

Models, Postulates, and Generalized Nomic Truth Approximation

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The qualitative theory of nomic truth approximation, presented by Kuipers (2000), in which 'the truth' concerns the distinction between nomic, e.g. physical, possibilities and impossibilities, rests on a very restrictive assumption, viz. that 'theories in the making' claim to precisely characterize the boundary between nomic possibilities and impossibilities. Fully recognizing two different functions of theories, viz. excluding and representing, this paper drops this assumption by conceiving theories in the making as tuples of

postulates and models, where the postulates claim to exclude nomic impossibilities and the models claim to represent nomic possibilities, leaving ample room for temporary undecided conceptual possibilities.

Thermodynamics vs. Statistical Mechanics: A Matter of Logic

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We will try to take seriously the idea that a TD system is nothing over and above an SM system, while allowing for different laws applying to TD vs. SM systems. The difficulty in this we view as a logical one. We will show that there is a formally rigorous way to overcome the difficulty, based on case-intensional logic and sortal predication. That logical resource allows one to say that the gas as a TD system is a thing of a different sort than the gas as an SM system, and so has different persistence conditions resulting in different laws. We thereby gain a new perspective on the famous reversibility objection.

General Philosophy of Science VI **Contributed Papers**
Chair: Lane Desautels Room 5E, Friday 15:30 – 17:30

On a Rationale for Cognitive Values

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Cognitive values, such as simplicity, scope and explanatory power are typically assigned a secondary role in comparison with the epistemic values of accuracy and consistency, the core criteria to judge whether a theory is likely to be true (or empirically adequate). I criticize this conception, discussing proposals by Steel, Douglas and Elliot/McKaughan and suggest conceiving cognitive values as standards to assess the relevance of a theory for a given

problem. As an example, I discuss the application of standards for evidence and relevance on models used to understand the climate system versus to predict regional climate.

The Structure of Science: From Diachronic and Synchronic Accounts

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Over the last decades, science has grown increasingly collaborative and interdisciplinary and has come to depart in important ways from the classical analyses of the development of science that were developed by philosophers of science half a century ago. This talk presents a new account of the structure and development of contemporary science based on analyses of, first, cognitive resources and their relations to domains, and second of the distribution of cognitive resources among collaborators and the epistemic dependence that this distribution implies. On this background I shall describe different ideal types of research activities and analyze how they differ. Finally, analyzing values that drive science towards different kinds of research activities, I shall sketch the main mechanisms underlying the perceived tension between disciplines and interdisciplinarity and argue for a redefinition of accountability and quality control for interdisciplinary and collaborative science.

Measuring the Unmeasurable. Engineering, Mathematics, and the Computer: A New Mixture

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Engineering sometimes has to work with quantities that are neither empirically measurable nor can they be determined by theory. We claim that such

quantities are determined by measurement practices that mix and intertwine mathematics, simulation modeling, and experiments. We will illustrate our claim by discussing an example from chemical process engineering, namely the design of an absorption column for producing certain materials.

A core feature of these practices is how they employ mathematics as a tool. It has, as we will argue, remarkable properties. Parameterization and tuning play an essential role in making accessible quantities that cannot be empirically measured. Mathematics then does not grant consistency, but helps working with inconsistent sub-models. In such situation, we will argue, predictive performance plays a pivotal role – at the cost of explanatory capacity.

Measuring Unification

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Scientists tend to opt for simpler and more unified hypotheses. Such considerations are often viewed as at best pragmatic in matters of theory choice. In this talk, I put forth a novel conception and an associated measure of unification, both of which are demonstrably more than just pragmatic considerations. The discussion commences with a brief survey of some failed attempts to conceptualise unification. It then proceeds to an analysis of the notions of confirmational connectedness and disconnectedness, which are essential ingredients in the proposed conception of unification. Roughly speaking, the notions attempt to capture the way support flows / fails to flow between the content parts of a hypothesis. The more the content of a hypothesis is confirmationally connected, the more that content is unified. Since the confirmational connectedness of two content parts is determined by purely objective matters of fact, the proposed notion and measure of unification are themselves objective.

Historical, Social and Cultural Studies in Philosophy of Science III **Contributed Papers**
Chair: Willem van der Deijl Room 5H, Friday 15:30 – 17:30

The Argument from the Good Lot: Unconceived Alternatives and 19th Century Bacteriology

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Stanford argues that the "problem of unconceived alternatives" (PUA) can explain the pessimistic metainduction. Many scientific inferences are eliminative: they begin with candidate hypotheses, proceed to rank them, and then accept the most highly ranked. Yet eliminative inference only leads to truth if the true hypothesis is in competition to begin with. However, it is unclear whether causal inferences are susceptible to this problem, since they proceed from an exhaustive hypothesis space defined by the contradictories "C is a cause of E" and "C is not a cause of E". They thus leave no room for unconceived alternatives, although they do allow for debates about causal co-factors, intermediate steps, and alternative causes. The paper will explore these philosophical questions with reference to 19th century controversies about infectious diseases such as cholera and anthrax. The goal is a principled distinction between inferences that are vulnerable to the PUA and those that are not.

Debating Causation in the Life Sciences: A Systems Perspective on Causes and Effects of Cancer

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This paper reexamines philosophical accounts of causation and causal explanation in light of current debates about whether mutations are the cause or the result of cancer. The debates reveal conflicting conceptions of cancer as

either a cell-based disease, resulting from malfunctioning molecular pathways, or tissue-based disease exposing failure of higher-level organization. Is one of these positions simply mistaken about the cause of cancer, or could they both be right? I analyze a recently proposed framework within systems biology to relate the two views through the notion of circular or mutual causation. The systems perspective shifts the focus from properties of specific molecular causal activities to higher-level dynamics of the network as a whole. I argue that taking this view seriously implies that we need to go beyond the linear pathway view of causation and beyond the common understanding of complex disease in terms of diseased or broken mechanisms.

Metaphysics Naturalized? The Case of Classification in the Sciences

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This talk explores the possibility of a thoroughly naturalistic metaphysics of scientific kinds and classifications. While naturalistic philosophers of science tend to move away from metaphysics and turn to epistemological and practical issues, a metaphysical account is needed to explain why some kinds and classifications are used with more success than others. However, naturalistic philosophers of science face several problems. For one, metaphysics cannot simply be read off from either epistemology or practice. Thus, at least some a priori metaphysical considerations should be allowed into the account to guide the metaphysical analyses of individual cases. But a priori metaphysics is suspect from a naturalistic viewpoint. I will propose a resolution of this issue inspired by Goodman's work on the problem of induction, in which he argued that a philosophical account of a practice domain and actual practices mutually support and constrain one another by means of a "virtuous circle".

Philosophy in Unified Science: The Bipartite Metatheory Conception
(cancelled)

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The bipartite metatheory thesis attributes to the left wing of the Vienna Circle a conception of the nature of philosophy of science that sees the purely formal-logical analyses of the logic of science as complemented by empirical inquiries into the psychology, sociology and history of science. Three challenges to this thesis are considered here: that Carnap did not share this conception even on a programmatic level, that Carnap's detailed analysis of the language of science is incompatible with Neurath's, and, finally, that Neurath himself was confused about the programme of which the bipartite metatheory thesis makes him a representative.

Symposia & Contributed Papers VIII

The Tension between a Naturalistic and a Normative Approach to Explanation and Understanding **Symposium**
Organizer: Jan Faye
Chair: Jose Diez Room 5D, Saturday 09:30 – 11:30

An Evolutionary and Cognitive Approach to Understanding

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On Scientific Understanding without Explanation

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From Explanation to Understanding: Normativity Lost?

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Normativity and the Inferential Account of Understanding

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Among philosophers working on scientific explanation there seems to be a growing consensus that explanation is somehow connected to some form of understanding. However even though "understanding" has moved into focus of the debate it is not at all clear how this connection should be spelled out in details. The literature covers different views: some of them take a

naturalistic approach whereas others a much more normative approach. The symposium attempts to cast some light on the compatibility of and tensions between these two lines of thinking.

Probabilities, Chances and Statistics **Symposium**
Organizer: Mauricio Suárez
Chair: Nina Retzlaff Room 5E, Saturday 09:30 – 11:30

On Individual Risk

ALEXANDER P. DAWID
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Unsharp Best System Chances

LUKE FENTON-GLYNN
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Against Ontic Chances (cancelled)

JENANN ISMAEL
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Counterfactual Probabilities, Chances and Robust Explanations

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Propensities, Chances, and Experimental Statistics

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The nature of chance, its relation to probability and statistics, and its role within the sciences are all topics that have gained renewed interest in recent philosophy of science. This symposium aims to bring together five scholars who have already contributed to the emerging literature on chance, probability, and statistics, from different viewpoints in order to extract and discuss the implications of their work with respect to the nature of chance. In particular, the talks will focus on the relation between chances, probabilities, and experimental statistics. The arguments combine analytical approaches to the concepts involved with some careful scrutiny of some of the current methods of causal and probabilistic inference across the sciences.

General Philosophy of Science VII **Contributed Papers**
Chair: Jesus Zamora Bonilla Room 5F, Saturday 09:30 – 11:30

Conceptualizing Uncertainty: An Assessment of the Latest Uncertainty Framework of the Intergovernmental Panel on Climate Change

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We are facing severe uncertainties regarding the phenomenon of climate change. To address these uncertainties, the Intergovernmental Panel on Climate Change has introduced a new version of its framework for communicating uncertainty which involves a confidence and a likelihood metric to qualify findings. In this paper, I critically assess this framework. First, I look at the meta-documents which explain the uncertainty framework and argue that there are substantial conceptual issues which need attention. Secondly, I explore how the uncertainty framework is put into practice and show that

the conceptual problems of the framework manifest themselves in concrete practical problems for the authors of the assessment report. Based on these observations, I suggest, thirdly, improvements for the framework. I mainly argue that the confidence metric needs to be constructed in a different way which involves the clarification of the two sub-metrics agreement and evidence.

Causality and Natural Kinds

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Recently, Matthew Slater has presented a novel argument against the view that natural kinds need to be grounded either in causal properties or in causal mechanisms. Against Boyd's very popular Homeostatic Property Cluster theory, Slater argues that homeostatic mechanisms are neither sufficient nor even necessary for (biological) kinds to be natural. In response to causal theories of natural kinds, Slater maintains that kinds are associated with a cluster of properties whose co-occurrence is counterfactually stable. I present two arguments against Slater's SPC theory of natural kinds and in favor of my Causal Unification Theory of natural kinds (CUT). First, I argue that causal properties that result in the clustering of other properties are what account for the projectibility of kinds, and not just this clustering itself. Secondly, I argue that some kinds rather ground systematic explanations, which does not require clusters at all but rather causally important properties.

Pan-Perspectival Realism

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A brief sketch of my argument is that:

1) Because the world is so complex, all human representation is to some extent imprecise and/or inaccurate.
2) Perception is, or constitutively involves, representation. Consequently,
3) Not just scientific, but also perceptual, knowledge is qualitatively affected with the limitations as claimed in 1).
4) So scientific and perceptual knowledge are of a piece, and both an ever refinable but never exact view of the way things really are.

The No Miracles Argument without Base Rate Fallacy

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According to an argument by Colin Howson, the no-miracles argument is contingent on committing the base-rate fallacy and is therefore bound to fail. In this note, we demonstrate that Howson's argument only applies to one of two versions of the no-miracles argument. The other, more considerate version is not adequately reconstructed in Howson's approach and thus remains unaffected by his line of reasoning. We provide a Bayesian reconstruction of this version of the no-miracles argument and show that it is sound.

Philosophy of the Natural Sciences V **Contributed Papers**
Chair: Florian Boge Room 5G, Saturday 09:30 – 11:30

No Alternatives for What? Non-Empirical Evidence in the Case of String Theory

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String Theory is being developed for more than 40 years without empirical evidence to support it. But why do scientists trust their theory in the absence of empirical support? It has recently been argued, that in cases where empirical support is missing, non- empirical evidence may be able to support the theory. More concretely, Dawid et al. (2015) have shown within a Bayesian framework that the observation that no alternative to a theory has been discovered, at a given time and despite considerable effort, confirms the theory. I will argue that any such No Alternatives Argument is always relative to the specific set of problems the theory is meant to solve, which leads to two possible interpretations of their result: either everyone is justified to work on what they work on or one is strongly committed to independent meta-inductive support regarding one's set of problems, which in the cases most needed, i.e. theories of quantum gravity, cannot be sufficiently established.

The Borel-Kolmogorov Paradox and Conditional Expectations

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The Borel-Kolmogorov Paradox is typically taken to show a tension between our intuition that conditional probabilities with respect to probability zero events are well defined and the definition of conditional probability by Bayes'rule. We argue that conditional expectations are the proper mathematical tool to conditionalize. This theory yields conditional probabilities on probability zero events in the Borel-Kolmogorov Paradox. The alleged clash arising from conditional probabilities on probability zero events depending on what conditional expectation one uses to get them is resolved by showing that those different conditional probabilities are not conditional probabilities of the same event with respect to the same conditioning conditions in different parametrizations. Thus there is no clash between the correct intuition about the conditional probabilities with respect to probability zero events and the technically proper concept of conditionalization via conditional expectations.

Symmetries and the Identity of Physical States

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Symmetries in physics are mappings of a theory's state space onto itself which connect states that are in some sense “physically equivalent”. As debates have shown, this can mean two different things here:

First, symmetries can be descriptive redundancies in that any two states related by it represent the same physical state. Second, symmetries can connect distinct physical states, but without empirically detectable differences between them for observers confined to where they act. A core question in the philosophy of symmetries is which symmetries are on which side of this divide.

This contribution builds on a recent framework by Hilary Greaves and David Wallace and derives a result according to which, contrary to these authors, only global, but not local, symmetries connect physically distinct states. Given some plausible assumptions that capture our intuitive notion of physical state, mathematical states related by local symmetries must correspond to the same physical state.

Functional Emergence of Spacetime in Quantum Gravity

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Relativistic spacetime, according to many quantum theories of gravity, does not exist, fundamentally. This threatens the very possibility of the empirical confirmation of these theories. Their empirical coherence can be restored by securing the emergence of spacetime from the fundamental non-spatiotemporal structures. Establishing this emergence requires not just mathematical limits and approximations, but also a successful argument that these technical procedures result in appropriately local `beables'. We show in the context of two programs in quantum gravity---loop quantum gravity and causal set theory---that a recovery of the merely functionally relevant features of spacetime suffices to this end.

Philosophy of the Social Sciences I **Contributed Papers**
Chair: Paul Thorn Room 5H, Saturday 09:30 – 11:30

What Even is Explanatory Pluralism? - On the Multiple Manifestations of Explanatory Pluralism in Theory and Practice (cancelled)

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Recently, the quest for more explanatory pluralism in the social sciences has increased significantly. This paper raises the following question: How do philosophers' theories of explanatory pluralism fare with regard to their fit with current social scientific practice? After trying to set up a trichotomy of three major theories of pluralism, the paper intends to make two major claims: First, that philosophers focus too extensively on instances of non-complementary pluralism. As a result they fail to account for many instances of complementary pluralism that are frequent in scientific practice. Second, I want to argue that non-complementary theories of pluralism are not fully committed to pluralism: they neither imply genuinely pluralistic explanations, nor even endorse a pluralistic social science as a whole. What they endorse instead is a non-reductionist social science. However, mere non-reductionism is neither a sufficient nor a necessary condition of a pluralist social science.

Do Mechanism-Based Explanations make a Case for Methodological Individualism?

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In the recent philosophy of social science literature, we notice an increasing support for mechanism-based social explanations. Earlier pleas for social mechanisms were often closely linked to defenses of methodological individualism. However, more recent contributions seem to be loosening that

link and develop a more sophisticated account – ascribing a less important role to micro-foundations. In this paper, we want to review the impact of the social mechanisms-approach on methodological individualism and draw more radical conclusions with regard to the individualism/holism debate, severing the link between the social mechanisms-approach and individualism. Four steps will be taken: (a) there are more than two levels of social explanation; (b) levels of explanation are perspectival, thus neither absolute, nor unique; (c) seeking for microfoundations ánd macrofoundations as good heuristics; (d) there are no general preference rules with respect to the level of social explanations.

Modeling Inequality

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Econophysics is a new and exciting cross-disciplinary research field that applies models and modelling techniques from statistical physics to economic systems. It is not, however, without its critics: prominent figures in more mainstream economic theory have criticised some elements of the methodology of econophysics. One of the main lines of criticism concerns the nature of the modelling assumptions and idealisations involved, and a particular target are 'kinetic exchange' approaches used to model the emergence of inequality within the distribution of individual monetary income. This paper will consider such models in detail, and assess the warrant of the criticisms drawing upon the philosophical literature on modelling and idealisation. Our aim is to provide the first steps towards informed mediation of this important and interesting interdisciplinary debate, and our hope is to offer guidance with regard to both the practice of modelling inequality, and the inequality of modelling practice.

Cooperative Game Theory, Philosophy and the Social Sciences

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In comparison with other formal frameworks, cooperative game theory has been a largely neglected tool in philosophy, economics, and the social sciences alike. Investigations into cooperation, the evolution of norms and other interactive or interdependent problems and social phenomena often proceed without taking a cooperative game theory perspective. In this paper, we focus on one such case of neglect, namely theorising about fairness. We criticise recent work on fairness, such as Broome (1990) and Curtis (2014), and show how cooperative game theory both exposes and rectifies their shortcomings.

Symposia & Contributed Papers IX

Theory Choice meets Social Choice **Symposium**
Organizer: Alexandru Marcoci & James Nguyen
Chair: Christian J. Feldbacher Room 5F, Saturday 13:30 – 15:30

Arrow's Theorem and the Rationality of Scientific Theory Choice

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Can there be Neutral Choice Procedures in Science?

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On the Rationality of Theory Choice

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Evaluating Competing Theories via a Common Language of Qualitative Verdicts

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When evaluating theories, models or hypotheses scientists should be able to weigh up how well each competitor fares with respect to multiple scientific virtues. Kuhn (1977) argued that there is no unique algorithm to do this. Okasha (2011) imports Arrow's impossibility result to show that there is no

such algorithm whatsoever, and this provides a prima facie threat to the rationality of theory choice. This symposium evaluates the prospects of theory choice in light of this result and explores new perspectives on how formal models of rationality developed by social choice theorists can be utilized in the philosophy of science.

Local vs. Global Approaches to Realism **Symposium**
Organizer: Juha Saatsi
Chair: Ludwig Fahrbach Room 5D, Saturday 13:30 – 15:30

Forget Perrin (cancelled)

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Should the Debate over Scientific Realism go Local?

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Kinds of Evidence for Realism: Revisiting the Case of Atomism

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A Case for Local Realism

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This symposium examines an increasingly prominent distinction between two different approaches to scientific realism. Local approaches are piecemeal and turn on case-specific details regarding a particular theory, model, or set of scientific assumptions. Global approaches by contrast abstract away from case-specific details and turn on general assumptions regarding science and its method at large. We focus on three key issues in the local vs. global debate:

I. Assessing new objections to global arguments for and against realism.
II. Assessing prospects of purely local approaches.
III. Clarifying the interaction/relationship between the global realist arguments and first-order local scientific evidence.

Philosophy of the Natural Sciences VI **Contributed Papers**
Chair: Simon Friederich Room 5G, Saturday 13:30 – 15:30

Events, Quantum Mechanics and the Passage of Time

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The main question of this paper is whether a partially ordered succession of physical events is sufficient to ground objective becoming. There two objections to this claim. The first involves the question whether also quantum mechanics (QM), besides relativity, is fundamentally about physical events happening in temporal succession. Doubts depend on the fact that not only is the ontology of QM interpretation-dependent, but it also seems to involve the wave function and in any case extended fields. The second objection stresses that even if a positive answer to the first question could be provided, a succession of physical events – independently of whether one adopts standard, growing block, or branching models of Minkowski spacetime – would not suffice to provide a robust notion of becoming. The notion of becoming that is definable in any of the above models of Minkowski spacetime is merely relational, and as such it is incapable of supporting an absolute change in what exists.

Do We Need a Primitive Ontology to Make Quantum Mechanics Empirically Coherent?

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Empirical support for any scientific theory comes from observation of things and events in space and time. Hence, if a theory makes no room for such entities (which John Bell famously called local beables), it might undermine its own empirical basis and thereby face the threat of what Jeffrey Barrett has called empirical incoherence. Tim Maudlin and others have argued that this is the case for quantum mechanics, unless we supplement it with a primitive ontology, that is, local beables at the fundamental level. There are two ways to attack this argument, firstly by claiming that the quantum mechanical wave function can give rise to local beables even in the absence of a primitive ontology, secondly by denying that local beables are at all required to ensure empirical coherence. My paper will add some substance to the first line of attack (building upon work by Nick Huggett and Chris Wüthrich), while disputing the efficacy of the second one (recently advocated by Alyssa Ney).

There are No Mathematical Explanations

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If we take objective ontic dependence as the basis of explanation, then there cannot be mathematical explanations. What appear to be mathematical explanations are either highly abstract mechanistic explanations or reconceptualizations of the explanandum phenomenon in which mathematics as such does not play an explanatory role. Providing truth-conditions for the counterfactuals characterizing the recently proposed explanatory depend-

ency between abstract entities is problematic whether one entertains a realist metaphysics of abstract or mathematical entities or not. In pure cases of mathematical explanation, what is perceived as an explanatory advance with respect to phenomena is better seen as an increase in formal understanding, i.e., an increase in the understanding of our systems of reasoning and representation.

Presentism meets Black Holes again

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In a recent publication in the European Journal for Philosophy of Science, Romero and Perez argue black hole physics to spell insurmountable trouble for presentism. I will dissect their arguments, and find them flawed. Moreover, and contrary to their claims, I will explicitly show that the geometries considered by the authors do not spell definitive trouble of the kind considered for presentism. This does not, however, mean that presentism is safe throughout from all black hole geometries. I will dive deeper into black holes and present a more balanced picture of the threats they pose to the presentist.

General Philosophy of Sciences VIII **Contributed Papers**
Chair: Richard Dawid Room 5E, Saturday 13:30 – 15:30

Kuhn's Revolutions

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In the present paper I criticize a typical understanding of Kuhnian revolutions which I think is wrong. I have two aims: the first is exegetical, to show what Kuhn's revolutions were all about and the second conceptual, to show

what Kuhn has contributed to our concept of revolution. I argue that Kuhn's model of science does not offer a narrative of scientific development that can be tested for its truth or falsity as, for instance, Dan Garber seems to think. Rather Kuhn's extended concept of revolution functions as a philosopher's tool to highlight diversity in the practice and history of science in order to undermine a particular philosophical picture which stressed uniformity and linear cumulative progress. Revolutions before Kuhn also marked discontinuity, yet they were thought to lead to progress which is not the case with Kuhn who invoked the concept of incommensurability. In the paper I consider and criticize relevant recent work by, among others, Tom Nickles and Brad Wray.

How are Mechanistic Explanations Understood?

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There has been a burst of recent work on mechanistic explanation, as an alternative to the traditional covering-law model of scientific explanation. Within the mechanist tradition, there has been significant debate between those (particularly Craver) who hold that mechanistic explanations are `ontic', i.e that what explains is the mechanism itself in the world; and those (primarily Bechtel) who hold that mechanistic explanations are `epistemic', i.e. that what explains is primarily the description or the mechanism. I will attempt to show that we can sidestep this debate by turning to what Bechtel and Craver might claim about how we understand mechanistic explanations, which is a question that has not so far been addressed in any depth. I will build an account of understanding mechanistic explanation, and illustrate it by examining the mechanisms of supernovae, in a deliberate step away from the life sciences, where almost all accounts of mechanisms were developed.

From Classical Mechanics, to Special Relativity Theory, and Quantum Mechanics—Or: Why Structural Realists would Profit from Studying Structural Continuity by Means of Conceptual Spaces

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A viable realist position in the philosophy of science should be clear on what theoretical 'structure' is, and how continuity of such structure can be judged? We argue that the theory of conceptual spaces provides a rich non-symbolic framework to identify the structures of scientific theories as spatial entities. This framework serves to study the types of changes in the underlying conceptual space that occur when one theory historically replaces another; thus the continuity in structure that in fact obtains becomes more apparent than in extant accounts. Starting with a brief outline of how conceptual spaces apply to the reconstruction of empirical theories, we identify the types of change-operations that systematically transform a prior conceptual space into the successor space, and go on to present three key physical theories in their phase-space formulations: Classical Mechanics (CM), Special Relativity Theory (SRT), and Quantum Mechanics (QM).

Explaining Complex Dynamics by Structural Mechanisms

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In the following I want to argue that explanations of the generic behavior of complex systems may be best captured in terms of mechanisms. However, while the paradigmatic examples of mechanisms fit well into the existing

accounts of the concept, complex systems require a more structural reading. In order to mend this deficiency I will introduce the notion of structural mechanisms. With my analysis I want to explore an important class of cases that is just still inside the limits of mechanistic explanations.

Philosophy of the Life Sciences IV **Contributed Papers**
Chair: Justin Bzovy Room 5H, Saturday 13:30 – 15:30

Extrapolation in Basic Research (cancelled)

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Basic science relies on the epistemic practice of extrapolation from surrogate models, to the point that explanatory accounts are in fact composite pictures reconstituted from data gathered in a variety of distinct experimental setups. This raises two new challenges to previously proposed mechanistic-similarity solutions to the problem of extrapolation, one pertaining to the absence of mechanistic knowledge in the early stages of research and the second to the large number of extrapolations underpinning explanatory accounts. An analysis of the strategies deployed in experimental research supports the conclusion that, while results from validated surrogate models are treated as a legitimate line of evidence supporting claims about target systems, the overall structure of research projects also demonstrates that extrapolative inferences are not considered 'definitive' evidence, but only partially justified hypotheses subjected to further testing.

Model Organisms and Explanation

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Much research in the life sciences and biomedicine is organized around model organisms. Philosophers of science have identified several roles of model organisms, both epistemic and non-epistemic. The epistemic role of model organisms is invariably seen as licensing inferences to other organisms. This paper argues that the standard view of model organisms as proxies ignores, or takes for granted, a crucial epistemic role, i.e. explaining biological processes. I start by questioning an assumption about what is being extrapolated when model organisms are used as proxies. This leads me to articulate the explanatory role. In the remainder of the paper I will identify an investigative function unique to the explanatory role. Furthermore, I argue that the generality of epistemic results, which are gained by employing the explanatory strategy, depends not only on the degree to which underlying mechanisms can be generalized.

Modeling Organs with Chips: Design and Representation as Modeling Relations

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This paper uses discussions on modeling and representation to clarify the question as to how the product of the activity of technological designing should be conceived. Two kinds of modeling relation between vehicles and targets are distinguished which differ in their respective directions of fit. The representation relation has a vehicle-to-target direction of fit and the design relation has a target-to-vehicle direction of fit. A case study in bioengineering shows that a certain product of designing can participate in both, design and representation relations. The two relations are inverse relations of each

other and the case study further shows that a conception of modeling as involving only relations with a vehicle-to-target direction of fit is too narrow in order to account for models in science and engineering.

Explanation, Unification, and Mechanisms

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This paper presents a new account of unifying explanation. Kitcher's 1981 theory preserves much of the covering-law model, identifying explanation with subsumption of many diverse phenomena under a general argument pattern. Many scientific explanations, however, fit neither the unification nor covering-law accounts. An important variety of these, mechanistic explanations in biology, has received considerable philosophical attention (Machamer et al 2000). I argue that important examples of mechanistic explanation in biology involve at least three senses of unification. First, combining relations unify lower-level parts by connecting them into a new, complex whole. Second, a few combining relations recur across mechanistic explanations. Third, mechanistic explanations unify higher- and lower-level descriptions of the phenomenon of interest. I then discuss implications of these three forms of unification, particularly for recent debates about explanation in Systems Biology.

Poster Session

General Philosophy of Science
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Interest Relativity in the Best System Analysis of Laws

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David Lewis' Best System Analysis (BSA) of laws of nature has it that a regularity is a law just in case it appears in the best systematization of all the particular fundamental matters of fact. A common criticism of the BSA focuses on the interest relativity inherent in deciding what it means for a system to be the best. Proponents of the BSA (or variations of it) since Lewis have tended to embrace relativity despite the criticism, with the standard refrain being that the best system is "the best for us" (e.g. Loewer 2007 and , Cohen and Callender 2009). I argue in this paper that a proponent of the BSA can accept the interest relativity of its laws and provide (or at least make progress towards) an answer to the charge of insufficient objectivity. I illustrate how doing so may be done in two directions: In one I seek to identify rules for picking out the best system that are broadly agreeable. In the other I try to defend particular ways in which the laws may be interest relative.

What Good is Realism about Natural Kinds?

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I argue that Boyd's 'homeostatic property cluster kinds' (HPCK) account is neither necessary nor sufficient to explain success in science because i) individuating the constitutive factors of HPCK is a matter of human decision ii) the HPCK account does not accommodate successful scientific kinds that

cannot be described as HPCK and iii) the HPCK account includes as kinds things that by the lights of present science failed to latch onto the causal structure of the world. Failing to deliver on their epistemic potential the commitment to HPCK proves not to be the best available tool in the scientific realists' toolbox. I argue that there is not one notion of 'natural kind' that best serves science; in fact this notion changes and matures with scientific progress. The account I propose is a type of pluralism about accounts of kinds that serve some important epistemic role in science, which accommodates the strengths of the HPCK account, whilst not sliding into Dupre's 'promiscuous realism'.

Laws are Conditionals (cancelled)

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The ubiquitous schema 'All Fs are Gs' dominates much philosophical discussion on laws but rarely is it shown how actual laws mentioned and used in science are supposed to fit it. After consideration of a variety of laws, including those obviously conditional and those superficially not conditional (such as equations), I argue that we have good reason to support the traditional interpretation of laws as conditionals. Throughout the discussion I show how this conclusion impacts on a number of debates present in philosophy of science including the status of 'system-laws' and the relationship between laws and causal relations.

Natural Kinds, Causal Profile and Multiple Constitution

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The identity of a natural kind can be construed in terms of its causal profile. This conception is more appropriate to science than two alternatives. The

identity of a natural kind is not determined by one causal role because one natural kind can have many causal roles and several functions and because some functions are shared by different kinds. Furthermore, the microstructuralist thesis is wrong: Natural kinds are not identical with their microstructure. It is true that if A and B have the same microstructural composition then a sample of a chemical substance A is of the same chemical substance as a sample of B. However, the reverse does not hold. It is not the case that if a sample of a chemical substance A is of the same chemical substance as a sample of B then A and B have the same microstructural composition. This is because a macroscopic NK can be "multiconstituted" by different microstructures.

Scientific Representation and Representation-As

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We propose a novel answer to the question of in virtue of what do scientific models represent their targets? We call this the `DEKI' account: scientific representation requires Denotation, Exemplification, a Key, and Imputation. We argue that although denotation is typically taken as a relation that holds between proper name and bearer, there is no reason it cannot also hold between model and target. The central idea behind exemplification (inspired by Goodman and Elgin) is simple. A tailor's swatch of checkered cloth exemplifies the property checkeredness, by both instantiating, and referring back to, the property in question. In the same way, scientific models exemplify various properties they instantiate. Keys associate the properties exemplified by model with those potentially instantiated by the target system. A model user then imputes these onto the target system, thereby using a model to represent a target as thus and so.

A Difference-making Account of Causation

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I propose a difference-making account of causation that broadly stands in the tradition of counterfactual approaches. It is inspired by causal inferences of the Mill's methods type. There are three main differences in comparison with conventional counterfactual accounts such as that of David Lewis: the inclusion of a notion of causal irrelevance, background dependence of causal statements, and the way counterfactuals are evaluated. Essentially, the latter are true if there are actual instances realizing the counterfactual that differ from the original instance only in terms of irrelevant conditions. Based on the fundamental concepts of causal relevance and irrelevance, other causal notions can be defined. In particular, the difference-making account can identify causes in terms of INUS-conditions. While the account aims to be universal, it is particularly suited for contexts in which causal relationships need to be identified on the basis of observational data.

Representation and Explanatory Power

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Historically it has been argued that a theory represents phenomena either via: 1) its deductive consequences or 2) its semantic models. The first is nowadays abandoned. The second lives on in the Semantic View. It is true that in many instances a theory represents via its models. To maintain that this view is necessary and sufficient for explicating how theories represent the phenomena in their scope would, however, restrict the scope of theories and would rule out many scientific models from having representational capacity. It is on the latter kind of restriction that I am interested, and in particular in that it would rule out historically successful quantum mechanical

models that are initially constructed by the use of classical considerations and that at some point the classical functions are quantized. In order to understand the representational function of such models, I argue, it must be jointly explored with their explanatory power.

Theoretical Contingency and Scientific Realism (cancelled)

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If science is contingent, then one can have alternatives S', S'', S''', etc., to current science S which, as successful as S, yield results incompatible with those of S (call this the "contingency thesis," CT, and its negation the "inevitability thesis", IT). CT is a challenge for realism: if the results of a successful investigation of a certain subject matter are not inevitable, and alternative results are possible, then the hard-core of realism (there is a world out there which exists independently of our minds, and which our theories aim—and often manage—to describe, at least approximately) comes under fire. In this paper we: (i) distinguish various kinds of contingency to be found in science; (ii) suggest that the all-encompassing CT often discussed in the literature ought to be replaced by various CTs; and (iii) argue that sophisticated versions of scientific realism are compatible (at least) with one kind of contingency, which we call "theoretical contingency."

Philosophy of the Natural Sciences
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Holographic Duality as a Model for Quantum Gravity (cancelled)

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In this paper I discuss two philosophical questions regarding the main example of a holographic duality, namely, the so-called 'AdS/CFT correspondence': (i) The status of AdS/CFT as a model of quantum gravity, and, in particular, the question of background independence. (ii) The interpretation of the duality, developing an interpretational scheme that should be applicable to other examples of dualities.

The Metaphysics of D-CTCs: On the Underlying Assumptions of Deutsch's Quantum Solution to the Paradoxes of Time Travel

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Deutsch's model of systems traversing closed timelike curves (CTCs) relies implicitly on a substantive metaphysical assumption. He is employing a version of quantum theory with a significantly supplemented ontology of parallel existent worlds, which differ from the many worlds of the Everett interpretation. MWI does not support the existence of multiple identical copies of the world, which the D-CTC model requires. This has been obscured because he often refers to the branching structure of MWI as a "multiverse", and describes quantum interference by reference to parallel interacting definite worlds. But he admits that this is an approximation to MWI. The D-CTC model, however, relies crucially on the existence of a multiverse of parallel interacting worlds. Since his model is supplemented by structures that go significantly beyond quantum theory, and play an ineliminable role in its predictions and explanations, it does not represent a quantum solution to the paradoxes of time travel.

Classical Limit from a Quantum Logical Perspective

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The complete description of a quantum system involves non-commutative operators and as a consequence, the lattice of quantum properties is non-distributive. On the other hand, for classical systems, operators associated with properties commute with each other (the algebra of functions on phase space is commutative); thus, classical properties are distributive. According with recent works there are quantum systems which, under certain particular conditions, evolve in a special way: although initially the commutator between two operators is not zero, due to the time evolution it tends to zero. In other words, non-Boolean lattices become Boolean. In the present work we study this transition from an algebraic approach.

The Virtuous Climatologist

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This paper applies contemporary debates in virtue epistemology, particularly certain variants of Neo-Aristotelianism, to discussions on physical climate models It is asked whether and in case how current understanding of uncertainties in climate models can be improved by a virtue perspective. Thereby virtue epistemology is not understood to replace but to complement standard rule-based approaches. The IPPC's global climate projections are taken as study case to particularly highlight the role of the epistemic virtue of phronesis. It will be shown that with the help of dianoetic virtue

two related but distinct problems can be addressed: Firstly, the inability to assign probability-estimate to all relevant implications of greenhouse-gas emissions; secondly involvement of moral or social values in the empirical modelling in climatology.

The Colbeck-Renner Theorem as an Impossibility Theorem for Parameter Independent Hidden Variable Theories

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Recently, Roger Colbeck and Renato Renner (C&R) have claimed that "[n]o extension of quantum theory can have improved predictive power". If correct, this is a spectacular no-go theorem for hidden variable theories, implying that if a quantum state is supplemented with hidden variables, the values of these variables have no bearing on the probabilities of measurement outcomes. This suggests that the quantum state, without hidden variables, gives a complete description of a physical system.

Unfortunately, the derivation of C&R suffers from some major issues. In short, the derivation is hard to follow, additional assumptions seem to be necessary, and mathematically the derivation is inaccurate and incomplete. In this paper we start from scratch and perform a derivation avoiding these shortcomings, to see what remains of C&R's claim. The result is a theorem that is less general, but better founded, namely a no-go theorem for hidden variable theories satisfying Parameter Independence.

Philosophy of the Life Sciences
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Serendipity and Epistemic Merits of Use-Inspired Research

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Serendipity, applied to scientific knowledge, can be described as the art of making important discoveries by a combination of chance and perspicacity. This notion is widely used nowadays in order to defend an ideal of free inquiry. Notably, the pressure exerted on the autonomy of science by the presence of practical expectations would negatively influence the serendipitous processes, as a logic of discovery. The aim of this presentation is to question this intuitive link often made between serendipity and autonomous pure science. To do so, we identify three conditions which are traditionally considered as favoring serendipity: the epistemic diversity of investigation, the open-mindedness, and the desire to acquire new fundamental knowledge. Using theoretical argument and empirical examples taken from medical sciences, we suggest that use-inspired research is a privileged space where serendipity produces not only technical inventions, but also fundamental discoveries.

Mechanistic and Design Explanation in Biology (cancelled)

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In this paper we discuss a specific type of functional explanation used in biology to explain the presence of traits, called 'design explanation', and compare this model of explanation with mechanistic explanations of traits. We argue that design explanations provide a key explanatory element to construct "individual level" mechanistic explanations of traits, and provide plausibility constraints on the construction of mechanistic "lineage" explanations of the evolution of traits. In-depth analysis of design explanations thus offers means to extend and refine the mechanistic program to the explanation of (adaptive) traits.

Philosophy of the Cognitive Sciences
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Natural Kinds and Folk Kinds in the Psychological Sciences (cancelled)

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This paper will examine the role that natural kinds play in psychology and cognitive science, and ask whether folk psychological kinds are capable of fulfilling this role. I will first specify what I mean by natural kinds and folk psychological kinds, and then argue that the latter are not suitable for the job required of natural kinds in the psychological sciences. Whilst folk psychological kinds constitute what Hacking calls "human kinds", this is insufficient to qualify them for full natural kind status, even in the limited capacity outlined in this paper. Furthermore, the use of folk psychological kinds threatens to systematically undermine both theoretical and experimental work in psychology and cognitive science. For this reason, I will conclude that a concerted effort is required in order to develop new conceptual categories that more accurately reflect our understanding of the human cognitive system.

Reframing the Problem of Cognitive Penetrability

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Epistemological Constructivism argues that our experience of the world is mediated by our concepts because perception is cognitively penetrated and theory laden. CP encompasses cognitive influences on perception. Since not all cognitive influences are cases of CP, one need explain which cognitive effects are cases of CP. Discussions concerning the effects of CP for the epistemic role of perception center on whether the cognitive effects diminish the justificatory role of perception. Not all cases of CP, however, diminish

the justificatory role of perception. The problem is to explain why only some cognitive effects downgrade perception. To address these problems, I propose reframing the problem of CP so that it incorporates two factors that are usually ignored. The first is the distinction between early vision and late vision and the examination of cognitive effects on each stage. The second factor is the distinction between direct and indirect cognitive effects on perception.

Philosophy of the Social Sciences
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Modeling the Social Organization of Scientific Research: Lessons from Econometrics (cancelled)

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The influence of social factors on the pursuits of scientific knowledge has been studied extensively at least since Kuhn (1977). More recently, formal models and computer simulations have allowed philosophers of science and social epistemologists to dig deeper into the detailed dynamics of what influences research and experimentation, and to develop very seemingly realistic models of the social organization of science. These models purport to be predictive of the optimal allocations of factors like diversity of methods used in science, size of groups, and communication channels among researchers. In this paper we argue that current research faces an empirical challenge, similar to a challenge that occurred in the field of economics in the second half of the XX century and that gave rise to econometrics. The challenge is to connect simulation models with data. We present both optimistic and pessimistic scenarios about how the challenge may, or may not, unfold.

Formal Approaches to Philosophy of Science
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Italian Pragmatism and De Finetti's Philosophy of Probability

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De Finetti's philosophy of probability is highly influential in current philosophy of science: he is one of the founders of subjective Bayesianism. Two main philosophical ideas inform de Finetti's thought: operationalism and pragmatism. The former, however, calls for the identification of a phenomenon with the operations performed to measure it; but de Finetti saw probability as a primitive concept, existing independently of its measurement. A satisfactory explanation of this tension does not exist in the literature. Studying de Finetti's philosophical influence, the pragmatism of Vailati and Calderoni, we are able to give a new detailed and straightforward explanation for the link between de Finetti's operationalism and his pragmatism. Our reading sees the need for the former as dictated by the definition of 'meaning' given in the latter. Our approach also affords an interesting view on other salient aspects of de Finetti's philosophy, such as his verificationism and subjectivism.

Explaining Scientific Collaboration: On the Epistemic Efficiency of Groups in a Competitive Environment (cancelled)

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Scientific collaboration has kept developing since the 19th century, which can be explained by various factors, epistemic or non-epistemic. Based on existing results from a formal model of collaboration, we develop a functional explanation of collaboration. The model shows that small differences in the step efficiency of groups can result in large differences in success. We

further show that, if these results are aggregated, a robust pattern emerges regarding the successfulness of groups in various competing environments. We then argue that this can be used to develop a well-justified functional explanation, which agrees with the account of functional explanation defended by Kincaid. We conclude that this explanation has large scope since it can apply to any factor that improves the efficiency of groups at the step level, and emphasize that, because it relies on the application of the priority rule, it also has a social dimension.

Historical, Social and Cultural Studies in Philosophy of Science
Room 34, Thursday / Friday / Saturday 11:30 – 12:00

Determinism and Continuity: Irregular Vibrations of the String (1748)

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In this paper I give an account of the concept of irregular vibrations in order to highlight a deterministic argument in Leonhard Euler's 1748 undertake to solve the vibrating string problem. I show that in the context of this problem determinism is the foundation for Euler's legitimation of the use of arbitrary functions. I contrast Euler's use of this principle of determinism with Jean d'Alembert's appeal to continuity in solving the same problem (1747) and argue that whereas the uses of determinism and continuity are relatively similar in the structure of their respective proofs, the two principles have different foundations: the former is mechanical and the latter is metaphysical.

Some Misconstructions of Similarity and a Practice-based Defence of its Value

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In the past years philosophers of science have discussed the role played by similarity in the construction of scientific representations.

I aim to defend that, despite the strictures formulated on the value of similarity, it is beneficial to conserve the concept to explain how scientific representations advance understanding about the world. But to succeed in the attempt, it will be indispensable, first of all, to respond to at least some of those strictures; and secondly, to develop a specific account of similarity to explain how exactly it plays a role.

The central points of my approach will be: 1) the location of similarity in scientific practices instead of in a binary relation of representation; 2) the development of a integrating approach that takes different types of similarity (isomorphism, homomorphism, resemblance) as compatible to each other; 3) the characterization of similarity as inseparable from distortions of different kinds, all part of the same creative practices.

Pre-events

Normative Social Science after the Great Recession
Organizer: European Network for the Philosophy of the Social Sciences (ENPOSS)
Room 5E, Wednesday 09:00 – 12:00

Two Ways in which Economics has been Normative

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Well-Being in Post-Crisis Economics. Should We Shift Attention from Preference Satisfaction Theory to Objective List Theories?

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On the Normative Uses of Social Science

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Confirmation Meets Social Epistemology: A Theory of Inferential Judgement

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One important aspect of the social sciences traditionally discussed from the philosophical or methodological points of view is the relatively clear distinction between the 'positive' and the 'normative'. Though this distinction has been subjected to strong criticisms during the last decades, mainly due to

the lost of credibility of the 'value-fact distinction' within analytic philosophy of science, it is clear that the normative concerns are paramount in many of the critics that social science in general, and economics in particular, are receiving in connection to their having failed to contribute both to the prediction of the current economic recession and to the scientifically-grounded political responses to the increasing inequality and the decreasing levels of welfare that many societies are experiencing as a consequence of the crisis. We think it is important, hence, as a contribution from philosophical analysis of the social sciences, to reconceptualise the positive-normative dimension, both with respect to the analytic instruments that the social sciences deploy to describe, understand, and evaluate normatively-laden facts, and with respect to the ways in which the search of scientific knowledge on social facts can be put to normative uses by the citizens or their representatives. Participants in this workshop range from a wide specter of fields within the philosophy of the social sciences.

Recent Trends in the Philosophy of Social Science
Organizer: Paul A. Roth, Philosophy of Social Science Roundtable
Room 5G, Wednesday 09:00 – 12:00

Republicanism Then and Now

JAMES BOHMAN
Saint Louis University
bohmanjf@slu.edu

Reviving the Philosophy of History

PAUL A. ROTH
University of California-Santa Cruz
paroth@ucsc.edu

Normativity and Social Science

STEPHEN TURNER
University of South Florida
turner@usf.edu

The papers in this workshop explore a variety of different topics areas and related core issues in the contemporary philosophy of social science, including topics in political theory (republicanism and democratic theory), the "return" of philosophy of history, and the alleged special status of normative explanations within social science. Discussions of these issues will also make clear how issues in the philosophy of social science connect to some core issues in philosophy of science, and to what extent perhaps philosophy of science ought to take more notice of topics within philosophy of social science.

The Problem of Applicability is not a Problem
Organizer: Philosophy of Mathematics Association (PMA)
Room 5H, Wednesday 09:00 – 12:00

How to Dissolve the Problem of the Application of Mathematics

OTÁVIO BUENO
University of Miami
otaviobueno@mac.com

Mathematical Structuralism and Mathematical Applicability

ELAINE LANDRY
University of California
emlandry@ucdavis.edu

Mathematics and Inference to the Best Explanation

ØYSTEIN LINNEBO
University of Oslo
oystein.linnebo@ifikk.uio.no

Since much of philosophy of science depends on, or at least is informed by, philosophy of mathematics it is crucial that such connections be both highlighted and valued. Again, well-witnessing the varying perspectives and differing investigations of philosophers of mathematics the topics of this session will include: 1) arguments showing that the problem of applicability is a general philosophical problem that can be faced head-on by scientific investigation and so can be dissolved as a specifically mathematical problem; 2) arguments that understanding the proper notion of a mathematical axiom allows us to give an account or how systems, both mathematical and physical, can be said to have a structure, without our having to give a metaphysical or semantic account of what structures are "made of" or "refer to"; and, 3) arguments that investigate the use of inferences to the best explanation, both in mathematical and science, to then reconsider what this might tell us about both the nature of mathematical axioms and the application of mathematics to physical theories. Overall, our aim is to show that mathematical applicability is not mysterious, not unreasonable, and not really a problem for either the philosopher of mathematics or the philosopher of science.

Practical Information

Registration and information

You will find the conference registration and information desk in the center of the conference venue, building 25.22, ground floor. The address of the conference venue is Universitätsstraße 1, 40225 Düsseldorf. The registration and information desk will be in your service:

Wednesday:	11:00 – 19:00
Thursday:	09:00 – 19:00
Friday:	09:00 – 19:00
Saturday:	09:00 – 19:00

Registration and information desk phone: +49 (0)211 81 11605.

Conference venue

The conference venue is located in building 25.21 and 25.22 (directly connected) ground floor and U1 at the University of Duesseldorf (Universitätsstraße 1).

Conference rooms

The parallel sessions and symposia will be held in rooms 5D, 5E, 5F, 5G, and 5H. These rooms are at the ground floor. The plenary lectures as well as the EPSA General Assembly Meeting will take place in room 5D. The EPSA Women's Caucus will be held in room 5E. The poster sessions will take place in room 34 (floor: U1).

If you need technical assistance or encounter technical problems, please contact the conference assistants at the registration and information desk.

Venue Accessibility

All rooms are handicapped accessible. Disabled toilets are situated on floor U1. Ground floor and U1 are connected via elevators. Also the canteens as well as the Oeconomicum (reception) are handicapped accessible. For support just contact our crew at the registration and information desk.

Internet

Eduroam is available at the whole university campus: https://www.eduroam.org/. In case you have no eduroam access, you can also use the university WLAN (HHUD-W) free of charge. Username and password are provided in the conference binder. If there is urgent need, conference participants may also use a computer that is located at the registration and information desk.

Facebook

Participants are invited to use the Facebook site of EPSA for grasping further information and sharing their thoughts:
https://www.facebook.com/europeanphilosophyofscienceassociation

Printing

You have the opportunity to print at the registration and information desk. Please note that we can only print a few pages (e.g., flight tickets, but no handouts).

Luggage room

You can leave your luggage at the registration and information desk during the above mentioned service times. There are also lockers at floor U1.

Dinner restaurants

Close to the campus are only a few small restaurants for dinner. The closest one is “Scottie’s” next to the tram stop Christophstraße (see map), where Burger’s and also local food is served for a reasonable price. There is also a *Subway* around the corner of the main canteen. There are many nice restaurants in the city center. For traditional/local food you may consider:

- Brewery „Füchschen“: Ratinger Straße 28
- Brewery „Zum Schlüssel“: Bolkerstraße 41 – 47
- Brewery „Schlösser Quartier Bohème“: Ratinger Straße 25
- Brewery „Uerige“: Berger Straße 1

Conference dinner

The conference dinner will take place at brewery “Zum Schlüssel” <http://www.zumschluessel.de/> in Duesseldorf's city center on Thursday, 24 September, 2015. It includes three courses and one drink for 28 EUR (registration in advance necessary). To get there take tram 701 from Christophstraße (direction: Rath) to Heinrich-Heine-Allee. Take the exit "Bolkerstraße" and walk on to nr. 41 – 47. Our crew will wait for you starting from 19.15 at the main entrance of the venue to guide you there.

Coffee and refreshments

Coffee and tea will be served during the refreshment breaks. All refreshments are served in the foyer, room 52, and the canteen at floor U1.

There are also several cafeteria as well as a canteen at the university campus where you can pick up some drinks and sandwiches:

- University canteen at floor U1 of the conference venue (building 25.22)
- *Ex Libris* at the main library (right to the main entrance; see “Bibliothek at the map)

- *Café Uno* left to the main canteen ("Mensa") at building 21.11 in the north of the campus (see "Mensa" at the map)
- *Café Vita* right to the main canteen ("Mensa") at building 21.11 in the north of the campus (see "Mensa" at the map)

Lunch

Lunches on Thursday and Friday are up to the participants. A menu up to 80 people can be obtained at the canteen at the conference venue. If this place is too crowded, we suggest to use the main canteen ("Mensa"), located north of the conference venue in building 21.11 (see map). The lunch on Saturday is included in the conference fee and will be served at the conference venue.

ATM

The nearest ATM is located at the main library (see "Bibliothek" at the map). A second ATM is located at the main canteen ("Mensa").

Tourist information

At the old town is a tourist information point located on Marktstraße/corner Rheinstraße. See also <http://www.duesseldorf-tourismus.de/en/tourist-information-offices/>.

Police and medical assistance

If you need to call the police or need an ambulance, the emergency number is 112.

Taxi

You can phone up and book a taxi from a taxi office; call (24h): +49 (0)211 33333 or book at: <http://www.taxi-duesseldorf.com/>. A taxi from the university to the old town costs about 25 EUR.

Public transportation in Düsseldorf

If you need to use buses, trams, or the metro, you might want to buy a single ticket (about 2,60 EUR) or a day ticket (6,60 EUR) all for the zone A (the university is within this zone). There is also a 7-day ticket for about 21,20 EUR. The tickets can be purchased in the buses, trams (coins only), and the metro (coins only) as well as at ticket machines at the main station or the old town. You can find information about routes, timetables, and prices at the website of the Rheinbahn: <http://www.rheinbahn.de/>. To reach the conference venue from the main station, take U79 (below main station; roughly 15min) or tram 707 (in front of main station; roughly 20min), both direction: "Uni-Ost/Botanischer Garten", and exit at the final stop.

Transportation from/to airport

Please be aware that there are two airports associated with Duesseldorf: Duesseldorf Airport (DUS) and Airport Duesseldorf Weeze (NRN). While Duesseldorf Airport (DUS) is very close to the city, Airport Duesseldorf Weeze (NRN) is actually about 90 kilometers away from Duesseldorf.

Transportation from Duesseldorf Airport (DUS) to the main station costs about 25 EUR with taxi and about 2,60 EUR with train. For the latter buy a class A single fare ticket – valid up to 90 minutes after stamping – and take the train S11.

Social Program

Wednesday 23, 18:45 – 20:00, Oeconomicum: Reception

The reception is open for all registered conference participants. The reception will be held in the Oeconomicum (5 minutes walk from the conference venue). There will be short speeches of representatives of the Heinrich Heine University and of the City of Duesseldorf, accompanied with classical music and followed by a free buffet and informal gathering.

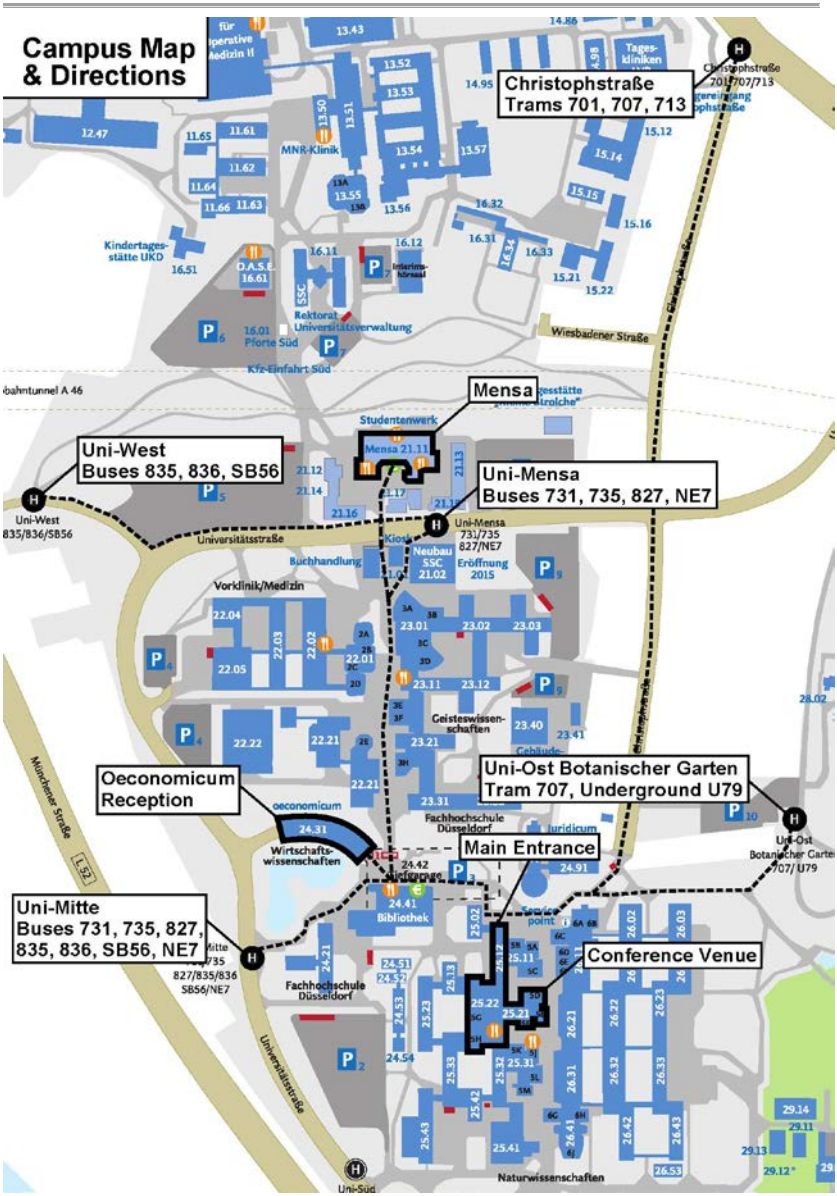
Thursday 24, 19:45 –, "Zum Schlüssel": Bolkerstraße 41–47 (old town): Conference Dinner

The conference dinner will take place at the brewery "Zum Schlüssel" in Duesseldorf's city center. It includes three courses and one drink for 28 EUR (registration in advance necessary). To get there take tram 701 from Christophstraße (direction: Rath) to Heinrich-Heine-Allee. There take the exit "Bolkerstraße" and walk on to nr. 41 – 47.
There will be guides leading you to tram 701 at Christophstraße. They will wait for you at the main entrance, starting at 19.15.

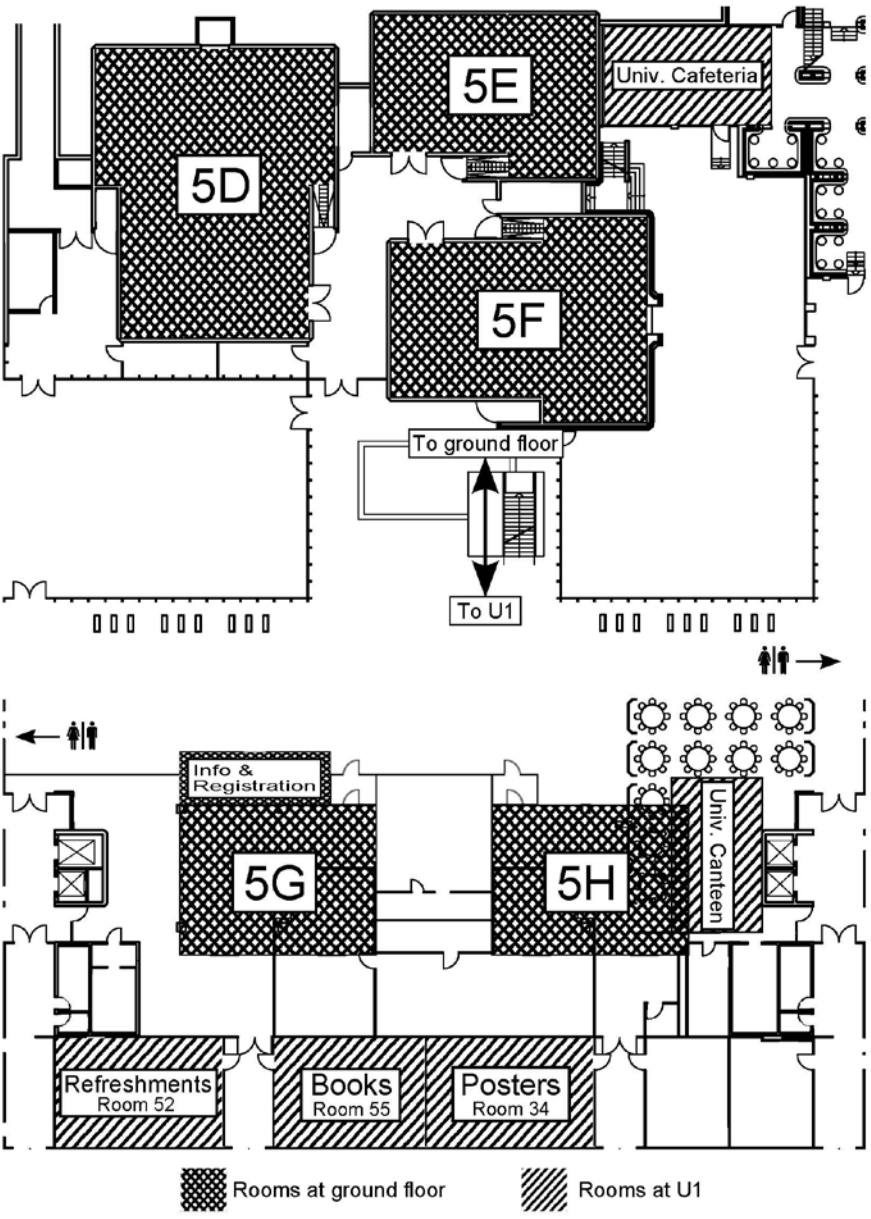
Saturday 26, 12:00 – 13:30, conference venue: Conference Lunch

On Saturday, there will be a free conference lunch for all participants at the conference venue. We will serve sandwiches from *Subway* and drinks.

Maps


Campus Map & Directions
Christophstraße Trams 701, 707, 713
Mensa
Uni-West Buses 835, 836, SB56
Uni-Mensa Buses 731, 735, 827, NE7
Oeconomicum Reception
Uni-Ost Botanischer Garten Tram 707, Underground U79
Main Entrance
Uni-Mitte Buses 731, 735, 827, 835, 836, SB56, NE7
Conference Venue
Universitätsstraße
Münchener Straße
Wiesbadener Straße
Vorklinik/Medizin
Fachhochschule Düsseldorf
Naturwissenschaften
Bibliothek
Mensa 21.11
Neubau SSC 21.02 Eröffnung 2015
Rektorat Universitätsverwaltung
Pforte Süd
Kfz-Einfahrt Süd
MNR-Klinik
Kindertagesstätte UKD
Studentenwerk
Buchhandlung
Wirtschaftswissenschaften
Geisteswissenschaften
Uni-Süd

Conference Venue: Buildings 25.21 & 25.22, ground floor and U1 merged



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