

SMS2

The second annual conference of the
SOCIETY FOR THE METAPHYSICS OF SCIENCE
Geneva, 15-17 Sept 2016

and

GPS

GROUND IN PHILOSOPHY OF SCIENCE
An international conference in the Sinergia project
Grounding – Metaphysics, Science and Logic
Geneva, 13-14 Sept 2016

FOREWORD

MESSAGE FROM THE PRESIDENT OF THE SOCIETY FOR THE METAPHYSICS OF SCIENCE

It is my pleasure to extend a warm welcome to you to Geneva, on behalf of the SMS officers, the program committee, and local organizing committee. Thanks to all who submitted their papers and everyone who has agreed to participate. You have allowed us to put together an impressive program for this second annual meeting of the Society for the Metaphysics of Science. The plurality of points of view and topics you will find represented at this conference reflects the diversity and fertility of our field. I look forward over the coming days to learning a great deal and enjoying many stimulating debates. I would like to thank the program committee for devoting so much time to putting together such a wonderful program. Also great thanks to members of the local organizing committee who have done so much to make our stay in Geneva comfortable and enjoyable. Finally, thank you to the University of Geneva and the journal *dialectica* for their generous financial support. If you haven't already, please "like" our Society's Facebook page and share with interested colleagues and students. We hope to see all of you again at SMS3 next year in New York!

Alyssa Ney

MESSAGE FROM THE ORGANIZERS OF GROUND IN PHILOSOPHY OF SCIENCE

We are delighted to welcome you at Ground in Philosophy of Science, an international conference in the SNF-funded Sinergia project Grounding – Metaphysics, Science, and Logic. We wish to thank all of those who expressed interest in the event, who submitted a paper, and who registered to the conference. This made it possible to put together an impressive program and organize what we believe shall be a memorable event. We sincerely hope that the conference will not only generate fruitful debates but also foster the birth of a research community working on this new and exciting topic, resulting in more interactions and conferences in the time to come. We wish you a great time in Geneva and look forward to your participation!

Lorenzo Casini & Marcel Weber

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GROUND IN PHILOSOPHY OF SCIENCE

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PROGRAM

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GROUND IN PHILOSOPHY OF SCIENCE

- 13 SEPT 2, Rue Jean-Daniel Colladon (Salle Simon Veil)
- 10:00–11:15 KEYNOTE. Marc B. Lange (UNC): *Grounding, Scientific Explanation, and Reducible Physical Properties*
- 11:15–11:45 coffee break
- 11:45–12:30 David M. Kovacs (Bilkent University): *Metaphysical Explanation, Unification, and Understanding*
- 12:30–14:00 lunch break
- 14:00–14:45 David P. B. Schroeren (Princeton University): *Scientific Explanation, Grounding, and Hyperintensional Ontology*
- 14:45–15:30 Haktan Akcin (Lingnan University): *Naturalized Metaphysics, Modal Structuralism, and Grounding*
- 15:30–16:15 Fabio Ceravolo (University of Leeds): *Superinternal Grounding vs Relativistic Composition*
- 16:15–16:45 coffee break
- 16:45–17:30 Philipp Blum (University of Lucerne): *Structuralism and Relational Individuation*
- 17:30–18:15 Beate Krickel (Ruhr-University Bochum): *What is Mechanistic Constitution?*
- 20:00 conference dinner
- 14 SEPT 2, Rue Jean-Daniel Colladon (Salle Simon Veil)
- 10:00–10:45 Christian Wüthrich (University of Geneva): *Grounding Time*
- 10:45–11:15 coffee break
- 11:15–12:00 Nina Emery (Brown University): *Laws and Their Instances*
- 12:00–12:45 Toby Friend (UCL): *Can We Ground Laws but Keep Them Explanatory?*
- 12:45–14:00 lunch break
- 14:00–14:45 Vanessa Triviño & María Cerezo (University of Murcia): *Dispositions and Grounding*
- 14:45–15:30 Mauricio Suárez (Complutense University of Madrid): *The Grounds of Objective Chances*
- 15:30–16:00 coffee break
- 16:00–17:15 KEYNOTE. Michela Massimi (University of Edinburgh): *Grounds and Nomological Necessity. Kantian Reflections*

SOCIETY FOR THE METAPHYSICS OF SCIENCE

15 SEPT	QUANTUM MECHANICS B101 / Chair: Christian Wüthrich	CONSCIOUSNESS, EXPERIENCE, TIME B104 / Chair: Giuliano Torrenco	CAUSATION, BIOMEDICAL ISSUES B105 / Chair: Frances Fairbairn
9:30–10:30	Claudio Calosi (University of Neuchâtel) <i>Quantum Mechanical Monism</i> Com.: Fabio Ceravolo (University of Leeds)	Giorgio J. Mastrobisi (University of Salento) <i>The Phenomenological ‘Essence’ of Relativity: Husserl and Einstein, a Comparison</i> Com.: Michael Ardoline (University of Memphis)	Nick Byrd (Florida State University) <i>A Causal Network Account of Ill-Being</i> Com.: Frances Fairbairn (Cornell University)
10:35–11:35	Nina Emery (Brown University) <i>Against Radical Quantum Ontologies</i> Com.: Alexander Skiles (University of Neuchâtel)	Natalja Deng (University of Cambridge) <i>Does Time Seem to Pass?</i> Com.: Andrea Roselli (University of Rome, Roma Tre)	Christian Sachse (University of Lausanne) <i>On the Notion of Dysfunction in Etiological Approaches</i> Com.: Duško Prelević (University of Belgrade)
11:40–12:40	Vera Matarese (University of Hong Kong) <i>A Coherent Ontology for the Aristotelian Pilot-Wave Theory</i> Com.: Mauricio Suárez (Complutense University of Madrid)	Torin Alter (University of Alabama) <i>Are There Brute Facts about Consciousness?</i> Com.: Giuliano Torrenco (University of Milan)	Maria Cerezo (University of Murcia) <i>Genes as Causal Powers</i> Com.: Maximilian Huber (University of Geneva)
12:40–14:00		lunch break	

15 SEPT	STRUCTURAL REALISM B101 / Chair: Torin Alter	MOTION, CLASSICAL PHYSICS B104 / Chair: Michael Ardoline	CONSTITUTION, REALIZATION B105 / Chair: Duško Prelević
14:00–15:00	Donnchadh O’Conaill (University of Helsinki) <i>Ontic Structural Realism and the Ontology of Relations</i> Com.: Simone Gozzano (University of L’Aquila)	Casey D. McCoy (University of Edinburgh) <i>Classical Motion and Instantaneous Velocity</i> Com.: Natalja Deng (University of Cambridge)	Michael Baumgartner & Lorenzo Casini (University of Geneva) <i>A Bayesian Theory of Constitution</i> Com.: Beate Krickel (Ruhr-University Bochum)
15:05–16:05	Lucas Dunlap (Western University) <i>The Information-Theoretic Interpretation of Quantum Mechanics and Ontic Structural Realism</i> Com.: Haktan Akcin (Lingnan University)	Sorin Bangu (University of Bergen) <i>The ‘Miracle’ of Applicability? The Curious Case of the Simple Harmonic Oscillator</i> Com.: Paniel O. Reyes Cárdenas (UPAEP)	James Difrisko (Konrad Lorenz Institute for Evolution and Cognition Research) <i>Token Physicalism and Functional Individuation</i> Com.: Thomas Bontly (University of Connecticut)
16:30–18:00		B101 / KEYNOTE ADDRESS Helen Beebe (University of Manchester) <i>Constructive Metaphysics</i>	

16 SEPT	CAUSAL EXCLUSION, FUNCTIONALISM	CHEMISTRY & BIOLOGY	BEST SYSTEMS
9:30–10:30	B101 / Chair: John Carroll Jonas Christensen (Aarhus University & Durham University) <i>Macro-Exclusion without Causal Drainage</i> Com.: Vera Hoffman-Kolss (University of Cologne)	B104 / Chair: James DiFrisco Johanna E. Wolff (MCMP) <i>From Macroscopic to Microscopic: The Curious Case of the Mole</i> Com.: Tuomas Tahko (University of Helsinki)	B105 / Chair: Casey D. McCoy Max Bialek (University of Maryland & University of Groningen) <i>Special Science Interests in the BSA</i> Com.: Max Kistler (University of Paris 1- Panthéon Sorbonne)
10:35–11:35	Neil McDonnell (University of Hamburg) <i>Causal Exclusion and the Limits of Proportionality</i> Com.: Vanessa Carr (UCL)	Andrew McFarland (NC State University) <i>Causal Powers and Isomeric Chemical Kinds</i> Com.: Philipp Blum (University of Lucerne)	Niels Martens (University of Oxford) <i>Regularity Comparativism about Mass in Newtonian Gravity</i> Com.: Casey D. McCoy (University of Edinburgh)
11:40–12:40	Xavi Lanao (University of Notre Dame) <i>Power Functionalism and Physical Modality: Overcoming Barker's Challenge</i> Com.: Stephen Barker (University of Nottingham)	Vanessa Triviño (University of Murcia) <i>Exploring the Inter-relations between Metaphysics and Biology Towards a Metaphysics of Biology</i> Com.: Christopher Austin (University of Oxford)	Markus Schrenk (University of Düsseldorf) <i>Emergence for Better Best System Laws</i> Com.: Toby Friend (UCL)
12:40–14:00		lunch break	

16 SEPT	HUMEANISM B101 / Chair: Nina Emery	POWERS, DISPOSITIONS B104 / Chair: Larry Moralez	REALISM, DETERMINISM, KINDS B105 / Chair: Frances Fairbairn
14:00–15:00	<p data-bbox="689 379 936 494">John Carroll (NC State University) <i>Becoming Humean</i></p> <p data-bbox="656 582 969 654">Com.: Alastair Wilson (University of Birmingham)</p>	<p data-bbox="1088 379 1357 494">William Bauer (NC State University) <i>Spatial Locations are Powers</i></p> <p data-bbox="1088 582 1357 654">Com.: David Limbaugh (SUNY)</p>	<p data-bbox="1491 379 1870 574">Michael Ardoline (University of Memphis) <i>What Laws? Which Past?</i> <i>Meillassoux's Realism of Physical Laws and its Consequences</i></p> <p data-bbox="1536 582 1825 654">Com.: Paavo Pylkkänen (University of Helsinki)</p>
15:05–16:05	<p data-bbox="689 699 936 813">Andreas Hüttemann (University of Cologne) <i>Problems for Humeanism</i></p> <p data-bbox="656 861 969 933">Com.: David P. B. Schroeren (Princeton University)</p>	<p data-bbox="1088 699 1357 853">Vassilis Livanios (University of Cyprus) <i>Categoricity, Locations, and Symmetry Operations</i></p> <p data-bbox="1088 861 1357 933">Com.: Joaquim Giannotti (University of Glasgow)</p>	<p data-bbox="1491 699 1870 853">Zdenka Brzovic (University of Rijeka) <i>Natural Kinds: Toning Down the Realist Hype</i></p> <p data-bbox="1536 861 1825 933">Com.: Petter Sandstad (University of Rostock)</p>
16:10–17:10	<p data-bbox="689 981 936 1096">Toby Friend (UCL) <i>Which Humean Regularities Could Ground the Laws?</i></p> <p data-bbox="656 1141 969 1216">Com.: Helen Beebe (University of Manchester)</p>	<p data-bbox="1088 981 1357 1136">Joseph Baltimore (West Virginia University) <i>Vector Modeling of Powers and Mutual Manifestations</i></p> <p data-bbox="1088 1141 1357 1216">Com.: Neil Williams (SUNY)</p>	<p data-bbox="1491 981 1870 1136">Joshua Norton (American University of Beirut) <i>The Hole Argument Against Everything</i></p> <p data-bbox="1536 1141 1825 1216">Com.: Michael Esfeld (University of Lausanne)</p>
17:30–19:00	B101 / BUSINESS MEETING		

17 SEPT	EMERGENCE B101 / Chair: Tuomas Tahko	EXPLANATION, MECHANISMS B104 / Chair: Beate Krickel	LAWS, EVENTS B105 / Chair: William Bauer
9:30–10:30	Umut Baysan (University of Glasgow) <i>Varieties of Strong Emergence</i> Com.: David M. Kovacs (Bilkent University)	Kate Vredenburg (Harvard University) <i>Idealization, Explanation, and Scientific Realism</i> Com.: Themistoklis Pantazakos (UCL)	Ben Henke (Washington University in St. Louis) <i>Nomological Contingency and Scientific Essentialism</i> Com.: Rory Jubber (UCL)
10:35–11:35	Fabio Ceravolo (University of Leeds) <i>Emergent Composites: A Plea for Layered, yet not Trivially Mereological Reality</i> Com.: Jessica Wilson (University of Toronto)	François Pellet (University of Münster) <i>Mechanisms, Aggregates, and Grounding</i> Com.: Kenneth Aizawa (Rutgers University)	Larry Moralez (University of Central Florida) <i>Affordance Ontology: Towards a Unified Description of Affordances as Events</i> Com.: Rebekka Hufendiek (University of Basel)
11:40–12:40	Alexander Carruth (Durham University) <i>Emergence, Reduction and the Identity and Individuation of Powers</i> Com.: Andrew McFarland (NC State University)		Jonas Ciurlionis (Vilnius University) <i>On Spatio-temporal Forms of Identification</i> Com.: Riccardo Baratella (University of Padua)
12:40–14:00		lunch break	

17 SEPT

MODALITY
B101 / Chair: Haktan Akcin

QUANTITIES, CHANCE, EVERETTIAN QM
B104 / Chair: Claudio Calosi

PHYSICALISM
B105 / Chair: Alyssa Ney

14:00–15:00

Cameron Gibbs
(University of Massachusetts, Amherst)
*Causal Essentialism and
Arbitrariness*
Com.: Vanessa Carr
(UCL)

Christina Conroy
(Morehead State University)
Everettian Antirealism
Com.: Alistair Wilson
(University of Birmingham)

Duško Prelević
(University of Belgrade)
*A Solution to Hempel's
Dilemma*
Com.: Brian Montgomery
(University of Texas at El Paso)

15:05–16:05

Petter Sandstad
(University of Rostock)
Essentiality without Necessity
Com.: Donnchadh O'Conaill
(University of Helsinki)

Michael Hicks
(University of Oxford)
Making Fit Fit
Com.: Michael Ardoline
(University of Memphis)

Douglas Keaton
(University of Alabama)
*Interventionism and
Old-School Functionalism*
Com.: Lorenzo Casini
(University of Geneva)

16:10–17:10

Frances Fairbairn
(Cornell University)
Advanced Modalizing
Com.: John Parry
(University of Leeds)

John Roberts
(UNC)
*A Case for Comparativism
about Physical Quantities*
Com.: Rory Jubber
(UCL)

17:10–17:30

coffee break

17:30–19:00

B101 / PRESIDENTIAL ADDRESS
Alyssa Ney (UC Davis)
*Separability, Locality, and Higher
Dimensions in Quantum Mechanics*

19:00–21:00

dialectica reception

ABSTRACTS

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Ground in Philosophy of Science

HAKTAN AKCIN (LINGNAN UNIVERSITY): NATURALIZED METAPHYSICS, MODAL STRUCTURALISM, AND GROUNDING I try to clarify the structuralist claim that the world has an objective modal structure with reference to the recent grounding discussions. Against criticisms that the ontological priority relations in OSR are vague, I highlight the scale-relative ontology suggested by Ladyman & Ross. Since structure is the real pattern in a scale-relative ontology, structure itself turns out to be the essence understood as the ontological prior. The analogy with grounding argument here might be established via Fine's suggestion that modality is grounded in essence. In a similar vein, we could argue that structure precedes modality in OSR. Along the way, I defend the necessitarian understanding of grounding, since otherwise our link to the ontological dependence relations, as pointed out by the opponents of OSR, would be lost. I finish by drawing an analogy between OSR and grounding with respect to causation. Grounding is usually understood as the metaphysical priority relation distinct from causation, and this approach is very much in accordance with Ladyman & Ross' exclusion of causation from fundamental ontology due to the fact that causal powers do not play a central role in fundamental physics.

PHILIPP BLUM (UNIVERSITY OF LUCERNE): STRUCTURALISM AND RELATIONAL INDIVIDUATION Recent and not-so-recent brands of structuralism have been motivated by the need to relationally individuate physical entities. The precise form of the argument from relational individuation to being 'nothing over and above' nodes in a structure has not been spelt out. I discuss critically several forms of such an argument, contrast them with parallel cases in the philosophy of mathematics and conclude that the prospects for a distinctly physical

form of physicalism do not look good.

FABIO CERAVOLO (UNIVERSITY OF LEEDS): SUPERINTERNAL GROUNDING VS RELATIVISTIC COMPOSITION Fans of grounding have been attracted by its promise to eschew eliminativism on medium-sized dry goods – understood as bearers of ordinary sortals: 'is a table', 'is a chair', etc. But the details are as yet unrevealed. In order to mark a way forward, I propose the following naturalistic methodology. One takes a physical theory that clearly poses an eliminativistic challenge. Following, one looks at which relation among the resources posed by the theory is responsible for raising the challenge. Finally, the relation is supplemented with the grounding-like features sufficient to solve the challenge. The supplementation, however, should not violate empirical adequacy and should not presuppose any further fundamental ideological structure, on pain of scoring lower on a virtue-theoretic count than the theory's eliminativistic interpretation. While the method nicely sets grounding in a naturalistically evaluable context, I will suggest (admittedly provisionally) that in some special relativistic cases the only grounding variety suitable for supplementing a physical package is not one that scores on a par on the minimality of fundamental ideology.

NINA EMERY (BROWN UNIVERSITY): LAWS AND THEIR INSTANCES What is the relation between a scientific law and its instances? This question has received little discussion in the literature, but neither does it have an obvious answer. On the one hand, many will want the relation between a law and its instances to be explanatory. On the other hand, few will think the relation between a law and its instances is causal. In this talk, I explore the view that laws ground their instances. I compare this view to

several competing accounts including those given by Woodward (2005) and Skow (2016). And I discuss several consequences that follow from it, including consequences for Loewer's (2012) proposal for how make sense of the explanatory power of Humean laws by claiming that laws scientifically explain the Humean mosaic while the mosaic metaphysically explains the laws.

TOBY FRIEND (UCL): CAN WE GROUND LAWS BUT KEEP THEM EXPLANATORY? A problem posed to the Humean approach to laws of nature is to show how it is possible for laws to explain first-order on-goings whilst also being grounded in them. Despite objections to the mode of argument for this concern with Humeanism, I think we ought to accept the conclusion that laws under Humeanism don't have a certain *metaphysical* sort of explanatory power. However, I want to suggest that Humeanism remains plausible despite this since there are arguments which amount to the analogous conclusions for all the prominent alternative accounts to laws. In particular, I will argue that nomic necessitation and dispositional essentialist accounts suffer from grounding laws in the very things laws are mooted to metaphysically explain. Showing this will require some careful analysis of what metaphysical explanation and essence do and do not amount to. It's not all bad news for laws, however, and I will draw attention to some non-metaphysical forms of explanation which serve to justify laws' role in science.

DAVID M. KOVACS (BILKENT UNIVERSITY): METAPHYSICAL EXPLANATION, UNIFICATION, AND UNDERSTANDING A number of philosophers today are interested in metaphysical explanation. Many of them think that these explanations are backed by the grounding relation, which serves as the *figluefi* that ties metaphysical explananda to their explanantia. In the background of this view is a

picture according to which explanations require the presence of determination relations, for example causation, grounding, and perhaps other relations as well, such as micro-basing or composition. Call this general picture the *determinative model*. In this paper, I offer a novel alternative to the determinative model, which I call Metaphysical Unificationism. This view is inspired by Philipp Kitcher's similar account of scientific explanation, and contends that explanatoriness is a holistic feature of those theories that derive a larger number of explananda from a meager set of explanantia. I will argue that Metaphysical Unificationism has several advantages. First, it reestablishes a link between explanation and understanding that has been ignored by determinative models of metaphysical explanation. Second, it avoids worries that pose a more serious problem to unificationist views of *scientific* explanation. Third, it can give us something that determinative views are by design unsuited for: a completely general theory of explanation.

BEATE KRICKEL (RUHR-UNIVERSITY BOCHUM): WHAT IS MECHANISTIC CONSTITUTION? Craver's *mutual manipulability account of constitutive relevance* is the most popular approach to mechanistic constitution. Constitutive relevance obtains, according to Craver, only if the putative mechanistic component and the phenomenon are mutually manipulable by means of Woodwardian interventions. Recently, different authors have argued that the mutual manipulability account is problematic (Leuridan 2012; Gebharter and Baumgartner 2015; Romero 2015; Harinen 2014): first, interventionism is not applicable to constitutive relevance relations because there cannot be ideal interventions into constitutive relationships. Second, a modification of the notion of an ideal intervention, as suggested by Woodward, that is supposed to solve the first problem, renders constitutive relevance causal. I will develop an account of constitutive relevance

that solves these problems while maintaining the merits of Craver's mutual manipulability account. My solution rests on a metaphysical analysis of the nature of mechanistic phenomena: phenomena are objects that participate in processes or states (*entity involving occurrents*, or *EIOs*; Kaiser and Krickel 2016). Mutual manipulability can be analyzed in terms of causal relations between the mechanism's components and *temporal parts* of the constituted phenomenon. Still, constitutive relevance is not a causal relation since it holds between the mechanism's components and the phenomenon *as a whole* and there cannot be causal relations between an event and its parts.

MARC B. LANGE (UNC): GROUNDING, SCIENTIFIC EXPLANATION, AND REDUCIBLE PHYSICAL PROPERTIES Explanation is a potential point of contact between philosophy of science and investigations of grounding. My talk will explore some of that potential. Although grounding is supposed to underwrite a kind of explanation alongside scientific explanation, "grounding explanations" are rather different from scientific explanations. I wonder whether grounds, when they explain, do so by virtue of being grounds. It may be that grounding is not an explanatory relation *per se*. I will then turn to the relation between grounding and scientific explanation. Some non-fundamental properties are merely arbitrary conglomerates of more fundamental properties, whereas other non-fundamental properties are natural enough to figure in scientific explanations. Because all of these properties are non-fundamental, some difference between the grounds of these two sorts of non-fundamental properties might be expected to account for their difference in explanatory role. I will look at some examples (such as center of mass, reduced mass, and Reynolds number). Ultimately, I will argue that perhaps surprisingly, no difference in the grounds of these non-fundamental properties is responsible for their dif-

ference in explanatory power.

MICHELA MASSIMI (UNIVERSITY OF EDINBURGH): GROUNDS AND NOMOLOGICAL NECESSITY. KANTIAN REFLECTIONS In this paper, I look at the role that the notion of "ground" played in the history of philosophy. In particular, I investigate Kant's mature view on the laws of nature and their necessity. I distinguish three kinds of grounds in Kant and I focus my attention on his notion of "real grounds" qua causal grounds underpinning laws of nature. Despite influential projectivist readings of Kant on laws, I argue that Kant subscribed to a metaphysically more robust image of nature. The notion of ground played a central role in it by delivering the nomological necessity of the laws of nature. These historical reflections bear on wider contemporary discussions in the metaphysics of science about dispositions, their causal basis, and relevance.

DAVID P. B. SCHROEREN (PRINCETON UNIVERSITY): SCIENTIFIC EXPLANATION, GROUNDING, AND HYPERINTENSIONAL ONTOLOGY Scientific theories are often thought to play various *modal* roles. For example, theories are used to make pronouncements as to what is *possible* and *necessary*, according to those theories. This modal role of theories may be taken to suggest that theories should be regarded as having an *intensional ontology*, i.e. an ontology which consists of entities that are individuated up to necessary equivalence. The purpose of this paper is to argue that theories ought to be regarded as having an ontology which is not merely intensional, but rather *hyperintensional*; i.e. an ontology which consists of entities that are individuated more finely than by necessary equivalence. I proceed by examining the *explanatory* role of theories; and in particular, by arguing (1) that paradigm cases of scientific explanation should be construed as hyperintensional, and (2) that scientific theories are often involved in grounding explanations. I illustrate the

consequences of this view by considering classical mechanics: although Hamiltonian and Lagrangian mechanics are mathematically intertranslatable by way of the Legendre transformation, I argue that they disagree on their hyperintensional ontology. Thus, taking seriously the explanatory role of theories allows us to distinguish, on principled grounds, between mathematically equivalent physical theories.

MAURICIO SUÁREZ (COMPLUTENSE UNIVERSITY OF MADRID): THE GROUNDS OF OBJECTIVE CHANCES We say that a particular coin has some propensity to land heads; that a radium atom has a certain propensity to decay within the hour; that a particular individual has a propensity to smoke, and that smoking has a propensity to cause lung cancer. In all these expressions, *a* is the propensity property of the object or chance set up, and *b* is its manifestation property. How do *a* and *b* relate, i.e. how do the propensity and manifestation properties relate? I explore three models, or accounts for the relation between propensities and their probabilistic or chance manifestations: indicative conditionals; conditional probabilities; and what I call grounded indexed probabilities. I argue that the first one confronts important semantic objections; the second one is refuted by Humphreys' paradox; and the third one is along the right track.

VANESSA TRIVIÑO AND MARÍA CEREZO (UNIVERSITY OF MURCIA): DISPOSITIONS AND GROUNDING The relation of grounding between *A* and *B* is generally described as a metaphysical relation of noncausal dependence that can be expressed by locutions such as “in virtue of”, “depends on” or “is determined by”. Despite of this characterization of grounding, there exists a wide debate with respect to whether grounding is a real metaphysical relation or not. The general aim of this paper is to contribute to this debate by exploring whether grounding relations can be recognized in a metaphysics of dispo-

sitions/powers. In particular, we will try to examine four relations that might be recognized in a realist metaphysics of dispositions/powers, namely: (A) the relation between a disposition and its categorical (or material) basis (B) the relation between a manifestation and its disposition (C) the relation between a new disposition that is the consequence of two or more other powers jointly manifesting and the manifestation of these latter powers and (D) the relation between a cause and the disposition whose manifestation gives rise to a causation process). We intend to analyse whether each of these relations meet the standard features attributed to a grounding relation or not.

CHRISTIAN WÜTHRICH (UNIVERSITY OF GENEVA): GROUNDING TIME Time seems to be the kind of aspect of our reality that ought to be primitive and hence fundamental in the metaphysical furniture of our world. However, as physicists have searched for a theory combining quantum physics with general relativity and replace them as fundamental physical theory, it has become increasingly clear that the ontology of such a fundamental theory will not contain anything resembling a (space-)time. Space and time, it appears, are absent at the fundamental level – they are grounded in something else – and only ‘emerge’ as effective phenomena at a coarse-grained scale. If that is so, any such candidate theory must establish the emergence of spacetime and its dynamical content from the fundamental structure atemporally, i.e., without conceiving of this emergence as a dynamical process in time. The goal of this paper is to articulate what this means and to consider one approach to formulating such a theory, viz. loop quantum gravity, and to study how temporality may emerge atemporally in its cosmological models. This paper is part of a larger joint project with Nick Huggett addressing this issue in different approaches to quantum gravity.

Society for the Metaphysics of Science

TORIN ALTER (UNIVERSITY OF ALABAMA): ARE THERE BRUTE FACTS ABOUT CONSCIOUSNESS?

The idea that there are brute facts about consciousness might seem to find support in anti-physicalist arguments such as the knowledge argument and the conceivability argument. Don't those arguments show that there are facts about seeing colors that are not grounded in any other sort of fact – and thus that there are brute facts about consciousness? I will argue that they do not. First, those arguments aim to establish an ontological gap between the physical and the phenomenal, and they do so partly by exploiting specific features of the physical. As such, they cannot establish a more general ontological gap between the nonphenomenal and the phenomenal. But they would have to establish such a more general gap to show there are brute facts about consciousness. Second, the arguments do not rule out panprotopsychoist Russellian monism, a view on which there are no such brute facts.

MICHAEL ARDOLINE (UNIVERSITY OF MEMPHIS): WHAT LAWS? WHICH PAST? MEILLASSOUX'S REALISM OF PHYSICAL LAWS AND ITS CONSEQUENCES

The work of Meillassoux set out in *After Finitude* is often critiqued for its inability to escape the problem it diagnoses, that of correlationism. However, this critique falls flat as Meillassoux has not attempted to dismantle correlationism, but to inoculate it against idealism by radicalizing the correlate so as to develop a speculative materialism as well as a justification for contemporary science. This inoculation is the first step of Meillassoux's attempt to restore "the great outdoors" to philosophy. With the proper goals of his work in mind, I will show that the ontological conclusion of Meillassoux's argument, the state of hyper-chaos, is unable to support his criteria for a legitimate grounding of science. To do this, I must first show that Meillassoux is com-

mitted to a realism of physical laws. I will then argue that the implications of this principle, in the form of hyper-chaos, coupled with Meillassoux's realism about physical laws actually prevents him from being able to meet his stated criteria of success against the aporia of the arche-fossil; not the lack of a correlation, but that the theory have the possibility of interpreting diachronic statements of science literally. This will be done by asking after all the possible interpretations of the effect of a hyper-chaotic on physical laws. These interpretations will be shown to either conflict with Meillassoux's requirement for literal statements about the past, or to be untenable as an explanation of contemporary scientific practice. The implicit support of realism about physical laws will be shown to be a barrier to the great outdoors. Ultimately, I will argue that in order to remain consistent and not propose a new form of scientific practice, Meillassoux must reform his arguments without the crutch of a realism of physical laws.

JOSEPH BALTIMORE (WEST VIRGINIA UNIVERSITY): VECTOR MODELING OF POWERS AND MUTUAL MANIFESTATIONS

Neuron diagrams are heavily employed in philosophical discussions of causation. However, Stephen Mumford and Rani Lill Anjum have recently argued that a dispositionalist account of causation is better served employing vector diagrams. In this paper, I raise some problems for Mumford and Anjum's vector modeling of causation. The central difficulty, I argue, is an inability to successfully accommodate the mutual manifestation of dispositions. I do, though, offer a potential way for Mumford and Anjum to adjust their account in order to better represent the cooperative sense of a mutual manifestation.

SORIN BANGU (UNIVERSITY OF BERGEN): THE 'MIRACLE' OF APPLICABILITY? THE CURIOUS

CASE OF THE SIMPLE HARMONIC OSCILLATOR

The simple harmonic oscillator appears in both classical and quantum theories, comes in various guises, and many physicists take it to be the most important physical system to solve. The thesis of this paper is that a careful analysis of the interplay of physics and mathematics in the treatment of this system serves as a surprisingly good illustration of what Eugene Wigner called the ‘miracle’ of applicability. While no claim is made that this is, generally, an unapproachable problem, it is argued that in this specific case the immediate responses run into difficulties.

WILLIAM BAUER (NC STATE UNIVERSITY): SPATIAL LOCATIONS ARE POWERS

Are spatial locations categorical properties or dispositional properties, that is, powers? This question is important for a number of topics in the metaphysics of science, such as whether all fundamental properties are powers or not. This paper first evaluates, and finds reasons to resist, three arguments presented by Brian Ellis that locations cannot be powers and are therefore categorical properties. This preserves the possibility that locations are in fact powers. Two prominent accounts of locations as powers, due to Stephen Mumford and Alexander Bird, are then examined. In contrast to these accounts, this paper presents a new positive argument that locations are powers based on several standard marks of dispositionality. The core idea, and the reason that locations bear all of the marks of dispositionality, is that they can manifest in becoming occupied by objects.

UMUT BAYSAN (UNIVERSITY OF GLASGOW): VARIETIES OF STRONG EMERGENCE

Strong emergence in metaphysics of science is often understood in terms of novelty of causal powers: strongly emergent properties are supposed to have causal powers beyond the causal powers of the properties that they depend on. It is also sometimes suggested that strongly emergent properties nomologically, but not

metaphysically, supervene on the structural properties that they emerge from. In this paper, I argue that, given some plausible assumptions about how properties are related to the causal powers that are associated with them, these two constraints on emergence, namely causal novelty and nomological supervenience, cannot be satisfied at the same time. I then explore two ways in which strong emergentists about special science properties can defend their views.

MICHAEL BAUMGARTNER (UNIVERSITY OF GENEVA) & LORENZO CASINI (UNIVERSITY OF GENEVA): A BAYESIAN THEORY OF CONSTITUTION

We develop a Bayesian theory of constitution that identifies as constituents those spatiotemporal parts of a phenomenon whose causal roles contain the phenomenon’s causal role. The proposal accomplishes two goals: first, it formally analyzes the notion of constitution present in theories of mechanistic explanation in a way that avoids the pitfalls of the currently dominant theory of constitution, viz. Craver’s (2007) mutual manipulability theory; second, by drawing on the conceptual resources of Bayesian networks, it paves the way for a Bayesian methodology for constitutional discovery.

MAX BIALEK (UNIVERSITY OF MARYLAND & UNIVERSITY OF GRONINGEN): SPECIAL SCIENCE INTERESTS IN THE BSA

Callender and Cohen’s (2009, 2010) Better Best System (BBS) analysis of laws of nature is fashioned to accommodate laws in the special sciences by allowing for any set of kinds to be adopted as basic prior to the determination of the laws. For example, setting biological kinds as basic will yield biological laws as the output of the best system competition. I argue that the BBS suffers from two significant problems: (1) it will run afoul of cases of interfield interactions that blur the boundary between the basic kinds of individual fields (e.g. photon talk in biology), and (2) it is unable to satisfac-

torily single out a set of laws as fundamental. I then propose a new best system style view and argue for its ability to account for special science laws, fundamental laws, and cases of interfield interactions.

ZDENKA BRZOVIC (UNIVERSITY OF RIJEKA): **NATURAL KINDS: TONING DOWN THE REALIST HYPE** Realism about natural kinds is a very attractive view in philosophy of science because it provides us with a straightforward answer to the question why many scientific categories are so successful in scientific explanations and predictions; namely, they correspond to some real or objective divisions in nature. However, realism about natural kinds faces a serious problem of providing an objective, mind-independent criterion for the objectivity of such groupings. I aim to show that it is hard to provide such a criterion for classifications in special sciences, which makes anti-realism about natural kinds a more viable view in this domain.

NICK BYRD (FLORIDA STATE UNIVERSITY): **A CAUSAL NETWORK ACCOUNT OF ILL-BEING** Depression is a devastating and common instance of ill-being which deserves an account. Since ill-being falls under the subject of welfare, we might look to extant accounts of welfare to account for instances of ill-being like depression. In this paper, I borrow from a causal network account of well-being and apply it to ill-being. First, I show how causal networks can provide a principled, coherent, and intuitively plausible account of instances of ill-being like depression. I then argue that a causal network account of ill-being stands to unify and make sense of empirical investigations of ill-being across multiple scientific domains, make institutional policy suggestions, and offer advice to individuals. The present account also provides both motivation and a framework for a more complete causal network account of ill-being. A complete causal network account of ill-being would complement an extant causal network

account of well-being. So if ill-being and well-being constitute all there is to the notion of welfare, then the present paper will be instrumental in providing a complete causal network account of welfare. If it turns out that there is more to welfare than ill-being and well-being, then the present account will at least be instrumental in advancing the philosophical and scientific discourse on welfare.

CLAUDIO CALOSI (UNIVERSITY OF NEUCHÂTEL): **QUANTUM MECHANICAL MONISM** The paper addresses whether quantum mechanics favors Priority Monism, the view that the universe is the only fundamental object. It considers several interpretations of quantum mechanics and argue that different interpretations support or fail to support Monism to different degrees.

JOHN CARROLL (NC STATE UNIVERSITY): **BECOMING HUMEAN** There is a story about laws of nature that needs telling. It includes a novel semantics for modal sentences that is based on mainstream ideas from linguistics, tweaked to eliminate the use of possible worlds. Using the semantics with an analysis of laws as regularities true because of nature yields a Humean concept of lawhood that is rich in many anti-Humean ways: not every true generalization is a law of nature and laws of nature govern. It can even turn out true to say about a Humean base, 'There are laws'. It can also turn out true to say about the very same Humean base, 'There are no laws'. That is some significant anti-Humean desiderata met. Nevertheless, should this story be true the core of anti-Humeanism would be based on a conflation.

ALEXANDER CARRUTH (UNIVERSITY OF DURHAM): **EMERGENCE, REDUCTION AND THE IDENTITY AND INDIVIDUATION OF POWERS** Emergentists hold that higher-level phenomena are something 'over and above' the sum of their parts. How this claim should be understood depends on

the kind of emergence being proposed: ‘weak’ emergence claims that higher-level phenomena are indispensable features of certain explanatory practices; ‘strong’ emergence takes ‘over and above-ness’ to be a matter of ontology. One recently popular way to characterise strong emergence is to say that emergent entities possess novel causal powers.

However, there is little agreement concerning the nature of powers. One controversy involves whether powers are single- or multi-track; that is, whether each power has only one manifestation type, or whether a single power can be directed towards a number of distinct manifestations. Another focusses on how powers operate: whether a lone power manifests when triggered by the presence of a suitable stimulus, or whether powers operate mutually such that several powers must ‘work together’ to bring about a particular manifestation. This talk examines how these distinctions – which can be cross-combined to frame four distinct accounts of the nature of powers – bear on the debate between emergentists and reductionists.

FABIO CERAVOLO (UNIVERSITY OF LEEDS):
EMERGENT COMPOSITES: A PLEA FOR LAYERED,
YET NOT TRIVIALY MEREOLOGICAL REALITY
Two views of understanding emergence in meta-ontological terms are contrasted. According to the more traditional layered view, emergents are derivative and ontologically dependent. According to Elizabeth Barnes’ view (2012), emergents are fundamental but ontologically independent, their fundamentality capturing their ontological novelty and their dependence capturing their being bound to emergence bases. I stand for the tradition, and argue for the following: (a) Barnes’ view cannot account for mereologically complex emergents, while it seems an open empirical question, rather than a conceptual truth, that there are such emergent composites; (b) all in all, the layered view provides the best balance between respecting Barnes’ desiderata, being open

to the existence of mereologically complex emergents and giving a non-primitive understanding of fundamentality and derivativeness.

MARIA CEREZO (UNIVERSITY OF MURCIA):
GENES AS CAUSAL POWERS
In this paper I revise the Dispositionalist theory of causation recently proposed by Mumford and Anjum (2011) and evaluate its explanatory potential and difficulties when it is applied to causal analysis in Biology. My main concern is with the application of their theory to Genetics, something that they do as an illustration of their proposal in chapter 10 of their book. I will try to deploy further the advantages and disadvantages of a dispositionalist conception of genes. After introducing some crucial features of their approach, I revise the advantages of their conception to account for complex biological phenomena, and in particular its potential to overcome the dispute between gene-centrism and developmentalism. In the central part of the paper, I raise a difficulty for the dispositionalist, namely, the difficulty to defend the simultaneity of cause and effect (essential in their proposal) when epigenetic processes are taken into account. I focus on a particular phenomenon, the mechanism of RNA alternative splicing. I end up exploring some ways out of the difficulty.

JONAS CHRISTENSEN (AARHUS UNIVERSITY &
DURHAM UNIVERSITY):
MACRO-EXCLUSION WITHOUT CAUSAL DRAINAGE
I defend Exclusionism – the view that the most fundamental microphysical entities exclude all macro- or special science entities from causal efficacy – against an argument from the possibility of infinite descent – the view that there is no bottom fundamental level. According to this argument, since infinite descent is possible, Exclusionists absurdly leave it an open whether there is causation at all or whether causal powers rather “drain away into a bottomless pit” (Kim 1998, 81). I distinguish between two versions

of this so-called drainage argument; an epistemic version according to which Exclusionists are presumptuously committed to endorsing the existence of a bottom level, and a modal version according to which Exclusionists are absurdly committed to the existence of causal relations being contingent on the existence of a bottom level. In response to the epistemic version, I argue that Exclusionists can endorse the existence of a bottom level without being epistemically presumptuous. In response to the modal version, I deny the commitment and argue that it is the truth of Exclusionism, rather than the existence of causal relations, that is contingent on the existence of a bottom level.

JONAS CIURLIONIS (VILNIUS UNIVERSITY): ON SPATIO-TEMPORAL FORMS OF IDENTIFICATION

I am going to argue that identity cannot be understood without spatio-temporal frame of reference. Also, as any object can be described as an event or to make it more strict: any object is an event, thus anything also must be considered as identical in time. Following this consideration four possible types of spatio-temporal identity are analyzed. Any object (event) can be identical: a) in space and time; b) in space but not time; c) in time but not in space; d) neither in space nor in time. Therefore, all objects (events) that are considered as being identical fall into one of these four spatio-temporal categories. This is true whether we have properties, features or qualities or any other factors which let us consider objects (events) as identical.

CHRISTINA CONROY (MOREHEAD STATE UNIVERSITY): EVERETTIAN ANTIREALISM

I argue that Everettian quantum mechanics [EQM] neither implies nor requires realism about the wave function. I argue that within the context of the relative facts interpretation [RFI] of EQM one ought to take the wave function to be nothing more than a mathematical tool, and that each of its terms ought

to be understood as a factual or counterfactual description of our world. I briefly describe the details of the RFI, then draw an analogy between this metaphysical picture and the actualist one developed by Alvin Plantinga in the 1970s and 1980s. It will be seen that the RFI presents a novel interpretation of Everett, one that implies that there is only one world, that generally all facts about objects are relations, and that the wave function is merely a mathematical tool used to describe the state of the systems that make up our world.

NATALJA DENG (UNIVERSITY OF CAMBRIDGE):

DOES TIME SEEM TO PASS? This paper is about one of the current philosophical debates about temporal experience, namely the one relating to the metaphysical question of whether time (robustly) passes. A-theorists think it does, B-theorists think it does not. I outline the A-theoretic argument from experience, understood as an inference to the best explanation. I don't question the inference, but focus on the premise that we perceptually experience time as (robustly) passing. I provide some reasons to reject it, and thereby to adopt a view that (when combined with the B-theory) is known as veridicalism. I show that there are good veridicalist explanations for why we are nevertheless sometimes inclined to think of time in A-theoretic ways. I then suggest that additional support for veridicalism arises from a certain deflationary view of the debate. I close with some reasons to adopt that deflationary view.

JAMES DIFRISCO (KONRAD LORENZ INSTITUTE FOR EVOLUTION AND COGNITION RESEARCH):

TOKEN PHYSICALISM AND FUNCTIONAL INDIVIDUATION Token physicalism is often characterized as a modest and relatively unproblematic physicalist commitment, as contrasted with type physicalism. This paper argues that functional individuation in biology is incompatible with token physicalism because the latter requires that biological indi-

viduals can be physically individuated without reference to biological functions. After presenting a naturalistic interpretation of physicalism, I evaluate the token identity thesis in terms of a model of minimal metabolism, concluding that the thesis is implausible. Objections related to parsimony, functions, and individuation are addressed in closing before suggesting that the theoretical role for token identity is better fulfilled with weaker relations like composition or constitution.

LUCAS DUNLAP (WESTERN UNIVERSITY): **THE INFORMATION-THEORETIC INTERPRETATION OF QUANTUM MECHANICS AND ONTIC STRUCTURAL REALISM** While Quantum Information Theory has been a majorly productive research program, what it tells us about the world is less clear. Attempts to use the framework of Quantum Information to develop an interpretation of quantum mechanics that can solve the Measurement Problem have been criticized for failing to give a metaphysically complete picture. In this paper, I argue that Ontic Structural Realism (OSR) can supply the metaphysical grounding for such a view. I develop the details of the combined account, and suggest that it can address some criticisms that the two views face separately, though it inherits some of the challenges faced by OSR.

NINA EMERY (BROWN UNIVERSITY): **AGAINST RADICAL QUANTUM ONTOLOGIES** It is becoming increasingly standard to claim that our best theories of quantum mechanical phenomena commit us to a view called wave function realism. According to wave function realism the physical space we inhabit is nothing like the physical space we appear to inhabit. In this paper I explore an argument against wave function realism that appeals to a type of simplicity that, although often overlooked, plays a crucial role in scientific theory choice – simplicity of fit between a theory and the manifest image. This argu-

ment can be understood as a rigorous way of spelling out the so-called “incredulous stare objection” that is sometimes leveled against surprising metaphysical theories.

FRANCES FAIRBAIRN (CORNELL UNIVERSITY): **ADVANCED MODALIZING** Advanced modals are true modal sentences that translate into counterpart theory as false. These sentences are popularly thought to show that the translation schema for modal realism is faulty, but that is misguided. The advanced modals are distinctive in that they are sentences in which a quantifier ranging over more than one possible world is scoped by a modal operator. The translation schema then artificially restricts quantifiers within the range of the modal operator which leads to odd results. But we should expect odd results. Modal realism is a view which analyses what might have been in terms of what is in different regions. Since what it is to be contingent is to be true of some regions and not others, there will be no fact about whether the spread of regions as a whole is contingent. Advanced modals make modal claims about the pluriverse in this way, so they should be regarded category mistakes.

TOBY FRIEND (UCL): **WHICH HUMEAN REGULARITIES COULD GROUND THE LAWS?** What features of the Humean mosaic could provide the grounds for laws? I discuss in turn the suitability of what I take as a typical first-pass answer and a more nuanced instrumentalist answer to this question in response to a dilemma Nancy Cartwright has posed concerning idealisation laws. I argue that neither of these approaches are satisfactory and propose a different ground for laws: regularities in the correlations of directed adjustments.

§1 introduces the idea of the Humean mosaic and Humean methodology as well as the question of laws’ grounding. §2 offers an intuitive first-pass answer to what grounds laws based on considera-

tion of laws' logical form. §3 poses the first-pass with Cartwright's dilemma concerning idealisation laws and §4 discusses the insufficiency of an instrumentalist response to the dilemma on behalf of the Humean. §5 develops an alternative Humean ground for laws and §6 confirms that this alternative satisfies our intuitions concerning grounds. §7 concludes.

CAMERON GIBBS (UNIVERSITY OF MASSACHUSETTS, AMHERST): CAUSAL ESSENTIALISM AND ARBITRARINESS One of our firmest intuitions about modality is that there is nothing arbitrary about logical space. There are no arbitrary gaps or cut-offs in the space of possibilities. I develop this intuition into an objection to a prominent view in the metaphysics of science: causal essentialism. According to the causal essentialist, causal and nomic relations are necessary. On some ways of developing this view we take each property's nomological and causal relations to be essential to that property. An alternative, and stronger, way of developing this picture is to hold that not only can there be no violations of the laws, but there cannot be any properties governed by laws other than our own. I distinguish and formulate these different versions of causal essentialism. I argue in each case that we are left with an unacceptably arbitrary conception of modality. This gives us reason to reject causal essentialism.

BEN HENKE (WASHINGTON UNIVERSITY IN ST. LOUIS): NOMOLOGICAL CONTINGENCY AND SCIENTIFIC ESSENTIALISM Scientific essentialism is the view that the laws of nature are grounded in the (typically dispositional) essences of things. Defenders have argued that scientific essentialism entails necessitarianism, the view that the laws of nature are metaphysically necessary. But necessitarianism is counterintuitive. It seems to be metaphysically but not physically possible that objects obey an inverse-cube law of gravitation. In defense of their theory,

scientific essentialists have pointed to the metaphysical and explanatory advantages of their view over rival theories. Necessitarianism is a bullet to bite, but it is one worth biting.

I turn this dialectic on its head. I argue, contrary to popular opinion, that necessitarianism has distinct advantages over contingentist accounts of law, because it is better able to model what I will call 'nomological contingency'. Since scientific essentialism is the most plausible necessitarian view on offer, therefore, it is *prima facie* preferable to rival theories.

MICHAEL HICKS (UNIVERSITY OF OXFORD): MAKING FIT FIT Reductionist accounts of objective chance rely on a notion of fit, which ties the chances at a world to the frequencies at that world. Here, I criticize extant measures of the fit of a chance system, and draw on recent literature in epistemic utility theory to propose a new model: chances fit a world insofar as they are accurate at that world. I show how this model of fit does a better job of explaining the normative features of chance, its role in the laws of nature, and its status as expert function than do previous accounts.

ANDREAS HÜTTEMANN (UNIVERSITY OF COLOGNE): PROBLEMS FOR HUMEANISM In this paper I will raise three problems for Humeanism. While none of these seems to me to be a knock-down argument they do undermine the credibility of Humeanism. The first problem concerns the characterisation of Humeanism in the light of quantum-entanglement. The second and third problems have to do with certain aspects of scientific practice that the standard Humean account of laws cannot account for.

DOUGLAS KEATON (FLAGLER COLLEGE): INTERVENTIONISM AND OLD-SCHOOL FUNCTIONALISM Recent years have seen several papers enlisting the new interventionist approach to causation in the

debate over the efficacy of unreduced mental properties. Non-reductive physicalists hope that interventionism will prove to be a silver bullet against Jaegwon Kim-style exclusion arguments. However, not everyone believes that interventionism is the panacea that its advocates hope it is. Recently, Lei Zhong and Michael Baumgartner have raised significant problems for interventionists. In this paper I defend interventionism against the Zhong and Baumgartner's objections. Though I provide distinct defenses against each, my defenses turn on a common theme. In each case I go old-school; I argue that the objections only seem to work if we elide key aspects of standard functionalist metaphysics – aspects that proponents of interventionism are entitled to take on board.

XAVI LANA O (UNIVERSITY OF NOTRE DAME):
 POWER FUNCTIONALISM AND PHYSICAL MODALITY: OVERCOMING BARKER'S CHALLENGE
 Barker (2013) argues that all available power-based accounts of physical modality (physical necessity/possibility, causation, disposition, etc.) are either incoherent or just a "notational variant" of non-power ontologies. In this paper I, first, analyze Barker's arguments focusing on his attack on functionalist power ontologies, and then argue that functionalist ontologies have the resources to respond to Barker's challenge by introducing a modified functionalist power ontology: Modal Functionalism (MF). In contrast to traditional functionalist power ontologies, MF does not define powers in terms of nomic/causal roles or relations between properties; rather, powers are defined as the realizers of modal functions defined in terms of possible states of the world. This modification allows MF both to define identity conditions for powers independently of nomic/causal relations and truth conditions for physical counterfactuals, thereby setting up a solid conceptual basis for developing fruitful connections between powers and physical modality.

VASSILIS LIVANIOS (UNIVERSITY OF CYPRUS):
 CATEGORICALITY, LOCATIONS, AND SYMMETRY OPERATIONS
 In this paper, I examine Molnar's arguments for the existence of spatiotemporal properties which are non-dispositional. Though his book Powers (2003), is a manifesto for the actual existence of fundamental genuine dispositional properties, he nevertheless argues that Dispositional Monism is false because we have a posteriori reasons to believe in the existence of actual categorical features as well. I argue that either Molnar's project is misdirected, since the properties he concentrates on are most possibly irrelevant for the debate between Dispositional Monism and Property Dualism, or, granted that the properties he chooses are indeed relevant, his arguments cannot prove that they are categorical without begging the question against Dispositional Monism.

NIELS MARTENS (UNIVERSITY OF OXFORD):
 REGULARITY COMPARATIVISM ABOUT MASS IN NEWTONIAN GRAVITY
 Huggett (2006) defends a version of relationalism about space that responds to Newton's bucket (i.e. the argument from inertial effects). Regularity relationalism uses the Mill-Ramsey-Lewis Best System Account to have both the Newtonian Laws and the inertial frames supervene as a package deal from a Humean mosaic. Comparativism – the view that mass ratios are not grounded in intrinsic masses – faces an analogous challenge to Newton's bucket (Baker, manuscript), suggesting the obvious route of using the regularity approach to have both the absolute mass scale (i.e. the intrinsic masses) and the laws of Newtonian Gravity supervening as a package deal from a mosaic containing mass ratios but no intrinsic masses. I discuss three objections to this view, and conclude that regularity comparativism is untenable. Firstly, comparativism blatantly violates the notion of separability that is presupposed in the Humean framework, even though that notion does not seem to do any crucial work in the regularity approach. Humeans

motivated by a dislike for necessary connections cannot give up on separability. Humeans motivated by ontological parsimony can, but this motivation leads to the second problem. Once we use the regularity approach to reduce intrinsic masses, the desideratum of ontological parsimony suggests that we should also use this approach to reduce mass ratios. There is no independent criterion for stopping the reduction beyond intrinsic masses. Hence, when the comparativists invoke the regularity approach they throw away the massive baby with the bathwater altogether. Finally it is argued that the comparativism case is importantly disanalogous to the relationalism case. It is argued that in the comparativism case the regularity protocol does not in fact succeed in picking out one unique absolute mass scale. The regularity approach is of no avail for the comparativist.

GIORGIO J. MASTROBISI (UNIVERSITY OF SALENTO): THE PHENOMENOLOGICAL ‘ESSENCE’ OF RELATIVITY: HUSSERL AND EINSTEIN, A COMPARISON. In this article I intend to clarify that the concept of essence is on one hand strictly connected to this pair of opposites: subjective-absolute and objective-relative and on the other hand how this conception is always to be considered in a re-defining “intersubjectivity” manner as consequence of irreducibility between the “Erleben” (experiencing) and the “Erfassen” (understanding) in the process of understanding thingly reality. To this interpretation all sense-objects are – as essence in phenomenological sense – only a specific and possible manner of consciousness-giveness in a continuous process of clarifying and understanding their totality and objectivity. I am going to affirm that every essence relating to something physical is a composition of different layers “many-sidedly” of different visions, a kind of essence of a different category “many-sidedly” constituted in my consciousness.

VERA MATARESE (UNIVERSITY OF HONG KONG): A COHERENT ONTOLOGY FOR THE ARISTOTELIAN PILOT-WAVE THEORY This contribution aims to offer a coherent ontology for the Aristotelian Pilot-wave theory. In the first part, I explain the twofold role of the wave function, which, on one hand, represents a field that performs a force on the particles, and, on the other hand, generates the possible trajectories of the particles. I point out how these two roles generate a tension in Valentini’s ontological account of the wave-field and I propose a way to solve this tension, by reformulating the concept of force as active dispositions of the field. In the last part, I defend the notion of force in Valentini’s pilot-wave theory and I discuss the problem of the violation of the third Newtonian law that the theory has to face.

CASEY D. MCCOY (UNIVERSITY OF EDINBURGH): CLASSICAL MOTION AND INSTANTANEOUS VELOCITY The impetus theory of motion states that to be in motion is to have a non-zero instantaneous velocity. The at-at theory of motion states that to be in motion is nothing over and above being at different places at different times. I first argue that there should be a preference for the at-at theory over the impetus theory. I note, however, that this point relies on the well-entrenched assumption that space is fundamental. This assumption is the basis for what I call the spatial view. I raise the possibility of a fundamental velocity based in “velocity space”, and then develop this velocital view in a way that is symmetric to the spatial view. I conclude therefore that there are no obvious grounds for choosing one over the other.

NEIL MCDONNELL (UNIVERSITY OF HAMBURG): CAUSAL EXCLUSION AND THE LIMITS OF PROPORTIONALITY Causal exclusion arguments are taken to threaten the autonomy of the special sciences, and the causal efficacy of mental properties. A recent line of response to these argu-

ments has appealed to “independently plausible” and “well grounded” theories of causation to rebut key premises. In this paper I consider two papers which proceed in this vein and show that they share a common feature: they both require causes to be proportional (in Yablo’s sense). I argue that this feature is a bug, and one that generalises: any attempt to rescue the autonomy of the special sciences from exclusion worries had better not look to proportionality for help.

ANDREW MCFARLAND (NC STATE UNIVERSITY): CAUSAL POWERS AND ISOMERIC CHEMICAL KINDS Some philosophers have claimed that (natural) kinds can be construed as mereologically complex structural properties. This essay examines several strategies aimed at construing a certain class of natural kinds, namely isomeric chemical kinds, in accordance with this view. In particular, the essay examines views which posit structural proper parts in addition to microconstitutive parts to individuate isomeric chemical kinds. It then goes on to argue that the phenomenon of chirality in stereochemistry gives the proponent of kinds-as-complex-properties evidence for positing the existence of causal-cum-dispositional individuating proper parts, in addition to structural parts, for chemical enantiomeric kinds.

LARRY MORALEZ (UNIVERSITY OF CENTRAL FLORIDA): AFFORDANCE ONTOLOGY: TOWARDS A UNIFIED DESCRIPTION OF AFFORDANCES AS EVENTS An argument is developed that suggests the concept of affordances can best facilitate the pursuit of new knowledge if it’s defined as an event. The first description initially generated by James J. Gibson was deceptively vague. This has led to several attempts by additional researchers to re-describe it. These efforts fall short of describing a concept that is consistent with both the historical context of Gibson’s work and his motivations for introducing the term. Additionally, no definition has been intro-

duced that aims to limit the scope of information researchers must consider when using the term. I put forth a description of affordances that is consistent with Gibson’s motivations and is pragmatically motivated to restrain the scope of inquiry. The application of this new description may lead to more fruitful experimentation and less problematic discourse throughout the disciplines that use the term.

JOSHUA NORTON (AMERICAN UNIVERSITY OF BEIRUT): THE HOLE ARGUMENT AGAINST EVERYTHING The hole argument can be extended to exclude everything. I will argue that there is nothing in the metaphysical commitment of a substantial manifold which makes it especially susceptible to the hole argument; other objects are just as susceptible to its terrors. This argument, the “hole argument against everything”, demonstrates how critically the original hole argument hinges on an unqualified notion of determinism and not on the diffeomorphic freedom of general relativity. Just as Earman and Norton argue that we should not let our metaphysics run roughshod over the structure of our physical theories, so I will argue that in particular we should not uncritically allow our metaphysics dictate what our physical theories must determine. Finally, in addition to the “hole argument against everything”, I argue in the “hole-hole argument” that unless we qualify what we mean by determinism, the substantial-relational debate degenerates into a category error. Our very ability to speak meaningfully about the metaphysical structure of spacetime requires that we reject the unqualified notion of determinism used in the original hole argument.

DONNCHADH O’CONNAILL (UNIVERSITY OF HELSINKI): ONTIC STRUCTURAL REALISM AND THE ONTOLOGY OF RELATIONS Ontic Structural Realism (OSR) is the claim that reality is fundamentally relational or structural. One challenge facing OSR is the worry that it renders the relata of

the structural relations mysterious or impossible. To develop this challenge, I shall consider the ontology of relations and relata and its possible implications for structuralism.

A number of structuralists have suggested that the relata must exist but are wholly relational in nature. I distinguish two different ways of interpreting this suggestion: the relata are mere nodes or intersections between relations, or the relata are constituted by the relations in which they stand. I argue that each of these interpretations leads to problems in understanding the nature of the relata.

FRANÇOIS PELLET (UNIVERSITY OF MÜNSTER):
MECHANISMS, AGGREGATES, AND GROUNDING

It has recently been argued by neo-mechanists that a naturalized metaphysics should admit mechanisms as fundamental units. Indeed, most mechanists who have embraced a kind of explanatory reductionism have also endorsed the relevant kind of ontological reductionism. Weak mechanistic reductionism is a kind of explanatory reductionism, according to which the explanandum phenomenon at one level is explained by the entities and activities situated at a lower level. The reduction stops here, because mechanisms are always more than the sum of their parts.

I will argue that a compositional interpretation of weak mechanistic reductionism is possible, by developing an argument showing that entities understood as structured wholes and their activities exist, because their structured parts and activities exist, and the structured parts and activities, in turn, exist, because their structured parts and activities exist, and so on. I suggest we should postulate ‘structureless atoms’ as a terminating regress both for the case of structures and activities. Whence, we can give an aggregative definition of mechanisms as being literally the sum of their parts.

DUŠKO PRELEVIĆ (UNIVERSITY OF BELGRADE):
A SOLUTION TO HEMPEL’S DILEMMA

The prob-

lem of characterizing physicalism is interesting for many reasons, mainly because, in the current literature, there is no consensus on how to do it and still capture its key features. In that respect, the so-called ‘Hempel’s dilemma’ might serve as a fruitful guide that can help physicalists to spell out their view in a more precise way. My solution to the dilemma is based on understanding physicalism as a research programme rather than a thesis or an attitude, as some philosophers argue. I contrast this proposal with the solutions proposed by currentists, futurists, and those philosophers who claim that physicalism should best be understood as an attitude, arguing that understanding physicalism as a research programme avoids problems that are present in the alternative views, and that it matches well with the standard classifications in the history of philosophy.

JOHN ROBERTS (UNC): A CASE FOR COMPARATIVISM ABOUT PHYSICAL QUANTITIES

Absolutists about physical quantities hold that particular mass-value properties – such as having a mass of one kilogram – are genuine monadic properties of bodies; comparativists deny this, saying that only mass-ratios between pairs of bodies are significant. (And similarly for other quantities.) Here I make a case for comparativism. I begin with an argument due to Dasgupta (2013), and consider a few important objections to it, rebutting some and revising and expanding on the comparativist thesis to get around others. While physical theories are usually formulated in absolutist terms, Dasgupta claims that any theory can be recast in comparativism-friendly terms (a claim that Baker (ms) argues against – here I respond to Baker’s argument on behalf of the comparativist). Moreover, Dasgupta claims, the absolutist version of a given theory is guilty of positing “surplus structure”. An absolutist can reply, however, that there are important relations among quantity-ratios that absolutism can explain and comparativism cannot. I show how the comparativist can get

around this problem.

CHRISTIAN SACHSE (UNIVERSITY OF LAUSANNE): ON THE NOTION OF DYSFUNCTION IN ETIOLOGICAL APPROACHES This paper shows that the function-dysfunction distinction in etiological approaches and a particular version of the epiphenomenalism problem are two sides of the same coin. Being a property token $b1$ (e.g. a gene) of a functionally defined type B requires the right sort of causal-evolutionary history explaining the existence of $b1$ – but it does not require that it actually does what defines B and $b1$ may thus dysfunction. Since the world is constantly changing, this non-requirement implies that $b1$ may diverge more and more from what defines B , which thus may have one day nothing to do with the actual role of $b1$. The paper argues furthermore that this problem is the price to pay for the function-dysfunction distinction.

MARKUS SCHRENK (UNIVERSITY OF DÜSSELDORF): EMERGENCE FOR BETTER BEST SYSTEM LAWS The Better Best System Account, short BBSA (developed by, e.g., Cohen & Callender 2009, 2010; Schrenk 2007, 2008, is a variation on Lewis's theory of laws. The difference to the latter is that the BBSA suggests that best system analyses can be executed for any fixed set of properties (instead of perfectly natural properties only). This affords the possibility to launch system analyses separately for the set of biological properties yielding the set of biological laws, chemical properties yielding chemical laws, and so on for the other special sciences.

As such, the BBSA remains silent about possible interrelations between these freestanding sets. In this paper, I explicate an emergence relation between them which preserves the autonomy or novelty of each special science's laws but also extracts their dependence: the autonomy of each level's generalisations is given because nomicity is conferred to them system intrinsic, their dependence is established via

their supervenience on lower level laws.

VANESSA TRIVIÑO (UNIVERSITY OF MURCIA): EXPLORING THE INTER-RELATIONS BETWEEN METAPHYSICS AND BIOLOGY: TOWARDS A METAPHYSICS OF BIOLOGY In this paper I aim at showing the relation that can be established between metaphysics and biology. A relation in which it is not only metaphysics which affects the way in which we understand some biological concepts and problems, but also biology which can shed some light with respect to some metaphysical problems, concepts and debates. In order to illustrate this interrelation, I will focus on the key concept in classical evolutionary biology, i.e., the concept of fitness, in order to show how the problems that biologists and philosophers of biology attribute to it can be solved by defining fitness under the metaphysical framework of Mumford and Anjum's dispositional theory of causation (Mumford and Anjum 2011). On the other hand, I will illustrate how this definition of fitness shed light to the metaphysical concept of "emergence" by showing that there are some properties in biology that seems to meet the features that metaphysicians have attributed to emergent properties.

KATE VREDENBURGH (HARVARD UNIVERSITY): IDEALIZATION, EXPLANATION, AND SCIENTIFIC REALISM This paper argues that two widely held thesis in the literature on scientific explanation, the strong realist thesis and idealization as explanatorily valuable are incompatible. Most of the work of the paper is done in setting up these two thesis; once they are properly explicated, the incompatibility drops out easily. Section 2 of the paper gives defines idealization and motivates idealization as explanatorily valuable. Section 3 explicates strong realist thesis. Section 4 will argue that idealization as explanatorily valuable is false, if the strong realist thesis is correct. Section 5 deals with an objection based on

work from Michael Strevens, which argues that the two theses are compatible.

JOHANNA E. WOLFF (MCMP): FROM MACROSCOPIC TO MICROSCOPIC: THE CURIOUS CASE OF THE MOLE In this paper I take a close look at the SI base quantity amount of substance, and its unit, the mole. The mole was introduced as a base

unit in the SI in 1971, and there is currently a proposal to change its definition. I argue, first, that the current definition of the mole creates a certain ambiguity regarding the nature of the quantity amount of substance. I then evaluate some of the criticisms this ambiguity has prompted. Finally I look at how the new proposal affects the ontological status of amount of substance.

PRACTICALITIES

CONFERENCE VENUES Ground in Philosophy of Science (GPS) takes place at 2, Rue Jean-Daniel Colladon (see map, B). The annual conference of the Society for the Metaphysics of Science (SMS) takes place at Uni Bastions, 5 Rue de Candolle (see map, A).

COFFEE/LUNCH BREAKS The coffee breaks listed on the program are served at the respective conference venues. For lunch, as well as for coffees or snacks outside the official coffee breaks, we recommend the university cafeteria at Uni Dufour, located nearby the conference venues (see map, C). Please notice that the cafeteria is closed on Saturday, 17 September.

CONFERENCE DINNER The conference dinner on September 13 takes place at the restaurant La Buvette des Bains, 22-25 minutes on foot from the conference venue (see list and map below, 10).

WINE RECEPTION The wine reception on September 17 takes place in 2, Rue Jean-Daniel Colladon (see map, B), Salle Simon Veil.

RESTAURANTS For a selection of restaurants in the university area, see below. Listed prices are indicative. For special wishes or dietary requests, please do not hesitate to ask the local organizers.

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| (1) <i>Wine & Food Fusterie</i> (terrace; steaks and traditional food; ~36 CHF). 5, Place de la fusterie. Tel: +41 22 311 36 36. | (6) <i>Les Armures</i> (french and swiss food; ~38 CHF). 1, Rue du Puits-Saint-Pierre. Tel: +41 22 310 34 42. |
| (2) <i>Thai</i> (thai food; ~55 CHF). Rue Neuve-Du-Molard. Tel: +41 22 310 12 54. | (7) <i>Chez Ma Cousine</i> (chicken specialities; ~22 CHF). 6, Place Bourg-de-Four. Tel: +41 22 310 96 96. |
| (3) <i>Cave Valaisanne et Chalet Suisse</i> (swiss food; ~35 CHF). 23, Boulevard Georges-Favon. Tel: +41 22 328 12 36. | (8) <i>Holy Cow!</i> (burgers; ~18 CHF). 14, Rue de Carouge. Tel: +41 21 312 24 04. |
| (4) <i>Les Trois Verres</i> (italian food; ~50 CHF). Rue Hornung. Tel: +41 22 320 84 62. | (9) <i>Restaurant Pizzeria Italia</i> (~23 CHF). 4, Boulevard des Philosophes. Tel: +41 22 328 29 70. |
| (5) <i>Cafe Restaurant de l'Hotel de Ville</i> (swiss food; ~46 CHF). 39, Grand-Rue. Tel: +41 22 311 70 30. | (10) <i>La Buvette des Bains</i> (lake platform; swiss food; fondue in the evening; ~20 CHF). 30, Quai du Mont-Blanc. Tel: +41 22 732 29 74. |

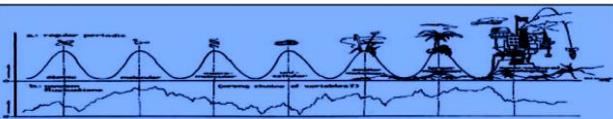


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Society for the Metaphysics of Science



<https://sites.google.com/site/socmetsci>

Grounding – Metaphysics, Science, and Logic

$$\exists M, w, w \in W_M : M, w, w \not\models \neg P_x \rightarrow \exists x \neg P_x$$
$$\exists M, w : M, w \models \neg \Box (\neg P_x \rightarrow \exists x \neg P_x)$$

<https://groundingproject.wordpress.com>