SMS3

Third Annual Conference of the Society for the Metaphysics of Science

Fordham University
New York
5-7 October 2017

Foreword

Message from the President of the Society for the Metaphysics of Science

It is my great pleasure to welcome you, on behalf of the SMS officers, the program committee, and the local organizing committee, to the third annual meeting of the Society for the Metaphysics of Science. This is an exciting time to be working at the intersection of metaphysics and philosophy of science—at that intersection lie some of the most interesting and important questions in philosophy. I think our program reflects this excitement, and I'd like to thank those who submitted papers and more generally those who agreed to present, comment, or chair, for enabling the program committee to assemble a first-rate and fascinating roster of topics and approaches. I'd also like to thank the institutions and people who have made this event possible, including Fordham University, hosting us here at Lincoln Center in fabulous Manhattan; the program committee, whose hard work resulted in our excellent final program; the local organizing committee, who have nicely orchestrated myriad on-the-ground details; Michael Strevens, our wonderful keynote speaker; and a special shout-out to Ken Aizawa, Lorenzo Casini, Max Kistler, and William Jaworski for diverse forms of assistance above and beyond the call of duty. I am really looking forward to seeing old friends, meeting new ones, and enjoying three glorious days of immersion in the metaphysics of science, and no doubt you are, too. Please visit our Facebook page for updates, and mark your calendar for SMS4, scheduled for August 22-24, 2018 in beautiful Milan, Italy!

Jessica Wilson

Society for the Metaphysics of Science

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Abstracts

Jesús H. Aguilar (Rochester Institute of Technology) and Andrei A. Buckareff (Marist College). Guiding Agency. For the last half-century the dominant theory of intentional action in analytic philosophy of action has been the so-called Causal Theory of Action (CTA). The CTA has also been subjected to varied criticisms since it began to emerge as the standard story of action. These criticisms have identified problems that were and are usually considered independent from each other. Nevertheless, underneath most of these problems it is possible to recognize a fundamental worry that is shared by all of them. This worry is that the CTA fails to account for intentional agency as opposed to merely intentional action. The recognition of a common problematic thread in all of the diverse criticisms of the CTA has the obvious benefit of offering a general single remedy in the form of a causal theory of agency. Not only do we believe that such a unified approach is possible, but we also contend that the causal theory of agency that is called for to remedy this fundamental worry is readily available. We identify this causal theory of agency as "CTAg" to distinguish it from the CTA, even though they are essentially complementary and in a sense partially redundant. In this paper, we offer a general blueprint for CTAg and put it to use as an answer to one of CTA's traditional problems, namely, the problem of action guidance.

Sorin Bangu (University of Bergen). On the Factivity of Scientific Understanding: the Argument from Idealizations. My primary intention in this paper is to highlight several subtleties overlooked by both parties engaged in the debate on the factivity of scientific understanding. Although I'm sympathetic to non-factivism (against Kvanvig), I will be critical about the way in which the position is currently defended. More concretely, I find Elgin's argument from idealizations (focusing on the ideal gas model) rather unclear and weak, so I suggest a way to fix and strengthen it.

Anouk Barberousse (University of Paris-Sorbonne), Françoise Longy (University of Strasbourg & IHPST), Francesca Merlin (IHPST – CNRS & University of Paris 1 Panthéon-Sorbonne), and Stéphanie Ruphy (University Jean Moulin Lyon 3). Natural Kinds: a New Synthesis. What is a natural kind? This old yet lasting philosophical question has recently received new, competing answers (Chakravartty 2007, Magnus 2014, Khalidi 2013, Slater 2015, Ereshefsky & Reydon 2015). We show that the main ingredients of an encompassing and coherent account of NKs are actually on the table, but in need of the right articulation. We propose such an integrative account which helps overcome some ill-conceived lines of debate. Our new synthesis clearly distinguishes ontological and epistemological is-

sues, defines natural kinds in purely ontological terms, and sheds light on the role that NKs play both within science and in everyday life.

MICHAEL BAUMGARTNER (UNIVERSITY OF BERGEN), LORENZO CASINI (UNIVERSITY OF GENEVA), AND BEATE KRICKEL (RUHR-UNIVERSITY BOCHUM). HORIZONTAL SURGICALITY AND MECHANISTIC CONSTITUTION. While ideal (surgical) interventions are acknowledged by many as valuable tools for the analysis of causation, recent discussions have shown that, since there are no ideal interventions on upper-level phenomena, which non-reductively supervene on their underlying mechanisms, interventions cannot—contrary to a popular opinion—ground an informative analysis of mechanistic constitution. This has led some to abandon the project of analyzing constitution in interventionist terms. By contrast, this paper defines the notion of a horizontally surgical intervention, and argues that, when combined with some innocuous metaphysical principles about the relation between upper and lower levels of mechanisms, that notion delivers a sufficient condition for constitution. This, in turn, strengthens the case for an interventionist analysis of constitution.

MICHAEL BERTRAND (AUBURN UNIVERSITY). METAPHYSICAL EXPLANATIONS BY CONSTRAINT. It is often thought that metaphysical grounding underwrites a distinctive sort of metaphysical explanation. However, it would be a mistake to think that all metaphysical explanations are underwritten by metaphysical grounding. In service of this claim, I offer a novel kind of metaphysical explanation called metaphysical explanation by constraint examples of which have been neglected in the literature. I argue that metaphysical explanations by constraint are not well understood as grounding explanations.

KENNETH BOYCE (UNIVERSITY OF MISSOURI). WHY EXPLANATIONISM WON'T GET YOU MATHEMATICAL EMPIRICISM. Proponents of the Quine-Putnam indispensability argument contend that the indispensable use of mathematics in our best scientific theories affords us with empirical grounds for believing that mathematical entities exist. A well-known weakness in this argument is that it relies on a nave brand of confirmational holism. Some contemporary defenders of the indispensability argument seek to get around this weakness by emphasizing the indispensable role mathematics plays in scientific explanation. I argue that this explanatory version of the indispensability argument fails for a similar reason; it relies on an explanationist analog of confirmational holism that also turns out to be false. Unlike other challenges to the explanatory indispensability argument, mine does not depend on denying the cogency of inference to the best explanation or the claim that mathematics plays an ontologically significant explanatory role within our best scientific theories.

UMUT BAYSAN (UNIVERSITY OF GLASGOW). WHEN IS A PROPERTY EPIPHENOMENAL? I offer a new argument that physically realized higher-level properties that are invoked in the special sciences are not epiphenomenal properties. This rests on an account of what it is for a property to have, or confer, some causal power. I argue that a property confers a causal power C insofar as it is lawfully necessitated that bearers of that property have C. From this, I derive a characterization of the notion of an epiphenome-

nal property: a property is epiphenomenal if and only if there is no causal power C such that there is a lawful necessity that all bearers of that property have C. Under this characterization, I argue that physically realized higher-level properties are not epiphenomenal because laws of nature impose causal similarities on the bearers of such properties, and these similarities figure as causal powers in the causal profiles of these properties.

Claudio Calosi (University of Geneva). The Possibility of Submergence. The paper argues that submergent properties —natural properties instantiated by proper parts that are not fixed by the properties of any whole they are proper part of—are metaphysically possible. It then explores consequences of such possibility. The example of submergent properties I will discuss draw on certain interpretations of quantum mechanics (QM), called Modal Interpretations. The core of the argument is that Property Composition Principle and Property Decomposition Principle fail. This entails that properties of the whole do not fix that of the parts. Or so I contend. Thus properties of quantum parts in Modal Interpretations of QM qualify as submergent properties. The argument to the metaphysical possibility of submergence depends then on the claim that physically possible worlds are a (proper) subset of metaphysically possible worlds. I then give a submergence argument for Pluralism.

Chloé de Canson (London School of Economics). The Method of Arbitrary Functions. There is widespread excitement in the literature about the method of arbitrary functions: many believe that it might provide a novel objective basis for non-trivial probabilities against a background of determinism. In this paper, I argue that it cannot.

Eddy Chen (Rutgers University). An Intrinsic Theory of Quantum Mechanics: Progress in Field's Nominalistic Program. In this paper, I introduce an intrinsic account of the quantum state. This account contains three desirable features that the standard platonistic account lacks: (1) it does not refer to any abstract mathematical objects such as complex numbers, (2) it is independent of the usual arbitrary conventions in the wave function representation, and (3) it explains why the quantum state has its amplitude and phase degrees of freedom. Consequently, this account extends Hartry Field's program outlined in Science Without Numbers (1980), responds to David Malament's long-standing impossibility conjecture (1982), and establishes an important first step towards a genuinely intrinsic and nominalistic account of quantum mechanics. I will also compare the present account to Mark Balaguer's (1996) nominalization of quantum mechanics and discuss how it might bear on the debate about "wave function realism". In closing, I will suggest some possible ways to extend this account to accommodate spinorial degrees of freedom and a variable number of particles (e.g. for particle creation and annihilation). Along the way, I axiomatize the quantum phase structure as what I shall call a "periodic dierence structure" and prove a representation theorem as well as a uniqueness theorem. These formal results could prove fruitful for further investigation into the metaphysics of phase and theoretical structure.

Mark Couch (Seton Hall University). Some Problems for Polger and Shapiro. This

paper provides some responses to Tom Polger and Larry Shapiro's recent The Multiple Realization Book (2016). I will first describe their framework for thinking about multiple realization and the conditions they claim this involves. In their view, claims about multiple realization should focus on empirical examples from science and be evaluated in terms of the taxonomies scientists produce (in contrast to a more purely metaphysical approach to kind individuation). I consider Polger and Shapiro's framework and explain where I agree and disagree with it. While there is a role for appealing to scientific taxonomies, I claim that we cannot characterize multiple realization without referring to certain notions about kinds and relevance neglected by their account. I explain how these notions can be included and what the result looks like. Time permitting, I then consider a few examples of multiple realization they discuss and the interpretations they offer.

NEIL DEWAR (LUDWIG-MAXIMILIAN UNIVERSITY MUNICH). ALGEBRAIC STRUCTURALISM. This talk is about how the notion of "structure" in ontic structuralism might be made precise. More specifically, my aim is to make precise the idea that the structure of the world is (somehow) given by the relations inhering in the world, in such a way that the relations are ontologically prior to their relata. The central claim is the following: one can do so by giving due attention to the relationships that hold between those relations, by making use of certain notions from algebraic logic.

JOHN DONALDSON (UNIVERSITY OF GLASGOW). VERTICAL VERSUS HORIZONTAL: CHOOSING THE BEST VERSION OF THE EXCLUSION PROBLEM. I outline two ways of reading what is at issue in the exclusion problem faced by non-reductive physicalism, the "vertical" versus "horizontal", and argue that the vertical reading is to be preferred to the horizontal. I discuss the implications: that those who have pursued solutions to the horizontal reading of the problem have taken a wrong turn.

TRAVIS DUMSDAY (CONCORDIA UNIVERSITY). GUNK AND THE DEBATE OVER IRREDUCIBLE DETERMINABLES. In the debate over the metaphysics of material composition, the three main positions are atomism, the theory of extended simples, and the theory of gunk. According to this last, all material objects have actual proper parts (i.e., each object is composed of proper parts that are themselves objects composed of proper parts that are themselves objects composed of proper parts, etcetera ad infinitum). In the debate over the metaphysics of determinable properties, some argue that determinables are reducible in some way to determinates. Here I argue that a model of such reduction proposed by Gillett & Rives (2005) is vulnerable to a potential objection arising from current physics, but that this objection could be sidestepped if their model were combined with an affirmation of the reality of gunk.

PETER EPSTEIN (UNIVERSITY OF CALIFORNIA, BERKELEY). A DESCRIPTIVE METAPHYSICAL INVESTIGATION OF EUCLIDEAN PROOF. For over two millennia, Euclid's Elements was seen as a paradigm of a priori reasoning. With the discovery of non-Euclidean geometries, and the eventual realization that our own universe is itself non-Euclidean, the status of our geometrical knowledge was radically undermined. In the wake of this upheaval, philosophers adopted two revisionary interpretations of Euclidean

proof. Some suggested that we understand Euclidean proof as a purely formal system of deductive logic fi one not concerned with specifically geometrical content at all. Others suggested that Euclidean proof employs concepts derived from our sensory experience or imagination. I argue that both interpretations fail to capture the true nature of our geometrical reasoning. Euclidean proof is not a purely formal system of deductive logic, but one in which our grasp of the content of geometrical concepts plays a central role; moreover, our grasp of this content is a priori, rather than being derived from experience.

Alison Fernandes (Columbia University). To Err is Still Humean (or Why Humeans have no Special Advantage When It Comes to Justifying the Principal Principle). Objective chances are used to guide credences and to explain. Defenders of Humean accounts (Lewis, Loewer, Hoefer) claim to be uniquely well placed to account for both features. Humean chances are objective, and so suitable for explanation. They reduce to patterns in actual events, limiting the possible divergences between relative frequencies and chances. It seems agents are guaranteed to do reasonably well when they align their credences to the chances. So principles linking chance to credence can be justified in a special Humean way. But there's a problem. When used scientifically, Humean chances and relative frequencies can diverge to arbitrarily high degrees. So when considering the scientific question of whether agents who align their credences to the actual Humean chances will do well, there is no guarantee. It is merely probable they will. This scientific use of chance undercuts the metaphysical advantage Humeans claim over their rivals in justifying chancecredence principles.

Fermín C Fulda (Western University). Three Grades of Naturalistic Involvement. Naturalism, the view that reality is exhausted by the immanent, self-contained space of causes that natural science describes using empirical methods, faces the challenge of naturalizing normativity. I argue that the standard reductionist and liberal strategies for naturalizing normativity lead into a dilemma between eliminativism and primitivism. Scientific practice, however, indicates that 'natural' is said in many ways. I distinguish between three criteria or "grades" of naturalism, each subsuming the previous one and each more demanding than the previous one: materialism, scientific emergentism, and scientific essentialism. I argue that the dilemma is predicated on an unnecessarily stringent essentialist criterion of what naturalism requires exemplified by microstructural kinds. However, universal phenomena familiar from the physics of complex systems dynamics indicates an alternative, less stringent emergentist criterion of naturalism that avoids the dilemma.

Joaquim Giannotti (University of Glasgow). Not Pure Powers But Something Near Enough. A number of metaphysicians have argued that a conception of properties as powers offers an ontological ground for the properties posited by physical theory. However, a conception of pure powers is problematic. I shall argue that powers, as standardly conceived, have qualitative, non-dispositional features. C.B. Martin's and John Heil's conception of properties as "powerful qualities" can accommodate these qualitative features of powers. Unfortunately, Martin's and Heil's view is

marked by a contentious identity claim. My aim is twofold. First, I will argue that a conception of powerful qualities is preferable to one of pure powers. Second, I will claim that a conception of powerful qualities does not require the commitment to Martin's and Heil's identity claim. I will begin by illustrating the metaphysics of powers. I will then argue against pure powers. Lastly I will elaborate the claim that powers are better regarded as powerful qualities.

Martin Glazier (UNAM). On the Necessity of Determinism. Determinism is a thesis about how things must evolve given the laws of nature. It is standardly formulated in terms of possible worlds: in every possible world in which such-and-such is the case, and whose laws are such-and-such, things evolve thus-and-so. But on the standard conception of possible worlds, such worlds are alternatives to the actual world. The standard formulation of determinism is therefore in danger of counterexample if some ways things could evolve do not constitute alternatives to the actual world. Drawing on Albert's solution to the problem of the direction of time, I develop such a counterexample. I conclude that determinism is instead properly formulated in terms of a nonstandard 'actualist' conception of possible worlds. The upshot is a distinction, anticipated by the two-dimensionalists, between two forms of metaphysical necessity which differ over whether our world must be actual.

Julie Godfrey (Durham University). The Problem of Meta-Laws for Dispositional Essentialism. Dispositional Essentialism (DE) has great difficulty accounting for meta-laws. DE takes properties as fundamental and laws as resulting from the dispositions of properties. Meta-laws are hard to account for as they are high-level and cannot supervene on individual properties. Meta-laws hold of many properties if not of the whole world. Steven French argues that this points towards Ontic Structural Realism (OSR). OSR is a reverse-engineering of DE (2014, 264) where laws (as opposed to properties) are fundamental. For French only making meta-laws fundamental avoids DE's problem. I explore various lines DE can use to defend itself and account for meta-laws. Further, I consider the prime example used against DE: conservation laws. It is hard for DE to account for (i) the conservation of mass-energy, (ii) many different properties being conserved. I argue only (i) – the conservation of mass-energy – is a concern for DE. I then show how DE can account for this and other meta-laws in future.

Jens Harbecke (Witten/Herdecke University). A Challenge for a Boolean Approach to Constitutive Inference. This paper discusses a challenge for a Boolean method for establishing constitutive regularity statements which, according to the regularity theory of mechanistic constitution, form the core of any mechanistic explanation in neuroscience. After presenting the regularity definition for the constitution relation and a methodology for constitutive inference, the paper discusses the problem of full variation of tested mechanistic factors. The apparent problem is that mechanisms are causal structures and typically do not allow for an independent variation of all of their entities/activities. A solution is offered to secure adequate constitutive inference nevertheless. The core idea consists in the introduction of "mechanisms slices" for which the Boolean method is applicable such that the mechanism is analyzed step by step. It is con-

cluded that the methodology of constitutive inference is consistent and plausible with respect to actual practice in neuroscience.

Benjamin Henke (Washington University, St. Louis). Actual Difference Making, Causal Selection, and Ranking Explanations. In causal explanation, we often engage in 'causal selection' by highlighting certain causes as doing privileged explanatory work. We might cite the striking of a match as the cause of a fire, for example, while relegating the presence of oxygen as a mere 'background condition'. Kenneth Waters (2007) proposes that causal selection tracks the distinction between actual and merely potential difference makers. I argue that while Waters's account handles a special class of causal selection cases, it fails to capture the much broader class of cases in which we select among multiple actual difference making causes. I provide an account of the degree of actual difference made using the statistical concept of variance explained and show how it handles the problem cases. I conclude, however, by showing that actual difference making accounts are subject to principled counterexamples. Actual difference making cannot provide a fully general account of causal selection.

Michael Hicks (University of Oxford). What Humean Laws (Can't) Explain. Because Humeans take facts about what the laws are to be made true by the totality of particular facts, Humean laws are often accused of explanatory inadequacy. I argue that the shoe is on the other foot. I hope to show here how philosophers with Humeans scruples are uniquely positioned to provide a satisfying explanation of our interest in counterfactuals and causal claims. I'll then argue that Humean should should follow Skow (2016) in holding that laws explain the explainers, rather than explaining the first-order facts. The view is that laws are principles that allow us to identify what explains what, but are not themselves directly involved in explaining events. I'll show how this view naturally follows from Humeanism. Humeans then have a particularly tidy account of why the laws explain the explainers, and a similarly simple account of why they are not themselves explainers. I'll then show how this view responds to objections to Humean laws.

Tyler Hildebrand (Dalhousie University). An Explanatory Shortcoming of Dispositionalism. According to dispositionalism, fundamental properties are dispositionsfipowers that don't reduce to other properties, laws, or anything else. A purported advantage of this theory is its ability to explain the uniformity of nature. All accounts of fundamental dispositions endow fundamental properties with a certain sort of structure. This structure enables explanations of regularities whose content aligns with that structure in the right sort of way. Unfortunately, it does not extend to other regularities. In this paper, I identify a type of natural regularity that cannot be explained by Alexander Bird's (2007) version of dispositionalism. (A longer version of this paper extends the argument to cover all versions of dispositionalism. If time permits, I'll discuss another prominent version of dispositionalism as well.)

Johannes Himmelreich (Humboldt University Berlin). Existence, Really? Higher-order Disagreements in Social Ontology. Many central questions of social ontology concern existence. Do groups have minds? Are there corporate actions over and above individ-

ual actions? And, very generally, what exists in the social world? When we answer these questions, there is room to talk past one another. Existence can be understood through more than just one conception and if two of us operate with different implicit conceptions of existence, we answer different questions. This is a deflationary view. Likewise, I call the deflationary hypothesis the claim that such talking past one another takes place in social ontology. In this paper, I present the deflationary hypothesis and argue that it is true or that, at least, it is plausible enough to be taken seriously.

VERA HOFFMANN-KOLSS (RUTGERS UNIVERSITY). CAUSAL MODELS AND THE DISTINCTNESS OF CAUSE AND EFFECT. Causes have to be distinct from their effects. If a traffic light turns from green to red, this can cause a car to stop. However, the light's turning from green to red does not cause the light to change color. More generally, an adequate theory of causation should not misclassify conceptual, logical, mathematical or other non-causal metaphysical relations as causal. The aim of this paper is to discuss how interventionist and causal modeling accounts can achieve this task. I first argue that neither the Causal Markov Condition typically imposed on causal graphs nor the Independent Fixability criterion proposed by Woodward can rule out all relevant cases of non-causal relationships. I then develop an alternative criterion based on the notion that the variables contained in a causal graph should not have overlapping supervenience bases. I conclude by briefly exploring the consequences of my argument for the current debate on whether causal models can solve the causal exclusion problem.

MARIO HUBERT AND DAVIDE ROMANO (UNIVERSITY OF LAUSANNE). THE MULTI-FIELD INTERPRETATION OF THE WAVE-FUNCTION. It is generally argued that if the wave-function in the de Broglie–Bohm theory is a physical field, it needs to be a field in configuration space. We show, however, that it can be regarded as a physical field in three-dimensional space. Indeed, we propose a novel interpretation of the wave-function as a new type of physical field: a multi-field. This interpretation of the wave-function was originally proposed by Peter Forrest in 1988 for standard quantum mechanics, and Gordon Belot briefly sketched in 2012 how this idea can be applied to the de BrogliefiBohm theory but finally dismissed it. We argue, however, that the advantages overweigh: The multi-field interpretation leads to a realistic understanding of the wave-function, while retaining the entire ontology in three dimensions.

ANDREAS HÜTTEMANN (UNIVERSITY OF COLOGNE). FUNDAMENTALITY IN PHYSICS AND METAPHYSICS. Physicists use terms such as "fundamental" and "fundamentality", so do metaphysicians. Physicists and philosophers of physics often invoke terms such as "fundamental physics", "fundamental particles" or "fundamental dynamics". In this paper I want to discuss whether fundamentality in the physicists' sense implies fundamentality in the metaphysicians' sense. More particularly I will look at three attempts to explicate what is meant by fundamentality in physics, namely those of Dresden (1974), Ladyman & Ross (2013) and Hoefer & Smeenk (2016). None of these, I will argue, implies metaphysical fundamentality.

SIEGFRIED JAAG (HEINRICH-HEINE UNIVERSITY DÜSSELDORF). LAWS DON'T REALLY EXPLAIN

Their Instances In this talk, a new puzzle is presented arising from two popular assumptions about laws of nature and explanation. It is argued that the claim that laws of nature explain their instances (explanatory laws) is in tension with the requirement that explanations need to be underpinned by robust 'wordly' relations (explanatory realism). It is then demonstrated that resolving this tension by giving up at least one of these assumptions amounts to a dialectical advantage for Humean reductionists about laws. This seems to be an interesting result since usually explanatory considerations have been thought to favor anti-reductionism about laws.

William Jaworski (Fordham University). Psychological Attribution: Theory vs. Pattern Recognition. We frequently explain what people do by attributing thoughts, feelings, and other psychological states to them. The theory model of psychological attribution claims that this is a species of theoretical explanation; we are positing hypothetical unobserved causes of observable behavioral effects. It is often assumed that the only alternative to the theory model is logical behaviorism, the now defunct view that psychological expressions are abbreviations for actual and potential bodily movements, gestures, and utterances. I describe an alternative to both the theory model and logical behaviorism: the pattern expression theory of psychological attribution. It takes the semantics of psychological expressions to be analogous to the semantics for natural kind terms articulated by Saul Kripke and Hilary Putnam. I explain how the pattern expression theory implies an attractive solution to the problem of other minds.

David Kinney (London School of Economics). Choosing a Level of Causal Description: A Pragmatic Approach. Several recent authors in philosophy of science argue that the most appropriate description of a particular causal relationship in nature is not necessarily the most detailed or fine-grained description of that relationship. However, the interventionist theory of causation does not provide any means of choosing the optimal level of causal description. My goal in this essay is to provide such a means. I argue that choosing the correct level of causal description can be understood as a pragmatic choice that is indexed to a particular decision problem. I show that for some decision problems, an agent would not pay any more to learn the value of a more fine-grained causal variable than she would pay to learn the value of a more coarse-grained causal variable. In these cases, the fine-grained description is not worth anything to the agent, and therefore the more coarse-grained description can be preferred. Alternatively, if the agent would pay more to learn the value of the more fine-grained causal variable, then she should use the more fine-grained variable in her description.

David Kovacs (Tel Aviv University). On the Old Saw that "Supervenience Is Not an Explanatory Relation". Supervenience was once considered a useful philosophical tool with a wide range of applications, but in recent years it has fallen out of favor. The emerging consensus today is that "supervenience is not an explanatory relation". In this paper, I will distinguish various claims that could be meant by this slogan. I will argue that on some interpretations of 'explanatory relation', we have been given no reason to believe that superve-

nience is unexplanatory, while on other interpretations, supervenience is indeed unexplanatory, but widely accepted textbook cases of explanatory relations come out as unexplanatory, too. Thus, there is no sense in which the slogan that supervenience is not an explanatory relation is both true and interesting.

Robert Kowalenko (University of Witwatersrand): Manipulationism, 'Scientific Possibility', and the Bugbear of Background Knowledge in Explanation. According to manipulationist accounts of causal explanation, to explain an event is to show how it could be changed by intervening on its cause. The relevant intervention must, according to Woodward (2003), be a 'serious possibility' distinct from logical, nomological, or physical possibility, approximating something I call 'scientific possibility'. This creates significant difficulties: judgments of scientific possibility often enter into a theory in the form of appeals to background knowledge, but invariant generalisations (the primary vehicle of explanation in manipulationism) are not well adapted to encoding such knowledge, and importantly, to integrating causal and non-causal background knowledge. A survey of extant research methodology such as case and comparative studies, RCTs, ethnographic methods, and structural equation modelling, suggests that regularity theories based on ceteris paribus-generalisations are superior in this regard, and a better fit for (social) science.

Xavi Lanao (University of Notre Dame). A Functionalist Account of Power Combination. I put forward a new account of power combination, i.e., an account of how powers operate together to produce effects that they would not produce where they isolated. For instance, if a particle instantiates two powers (mass and charge), the behavior of the particle will be a result from the combination of these two powers. A massive particle with no charge would behave in the same way that a particle that is both massive and charged. In order to do develop my account I analyze the main account of power combination in the literature developed by Mumford and Anjum (2011) and present its main challenges. From this analysis I extract general desiderata for a successful theory of power composition. Finally, I introduce my own account of power combination based on a functionalist account of powers (Functional Combination) and explain how it the desiderata for a successful account of power combination.

Dustin Lazarovici (University of Lausanne). Spacetime is One Whole – Structural Realism meets Priority Monism. In recent years, structural realism has enriched the debate about the ontology of spacetime by offering a middle ground or tertium quid (Dorato, 2000) between the traditional positions of spacetime substantivalism and relationalism. As a first approximation, we can characterize structural spacetime realism as the position that grants spacetime an independent existence, while insisting that spacetime points do not possess any intrinsic identity, provided by intrinsic properties or haecceities, but only a relational one, provided by the fundamental geometric relations they instantiate. The prima facie attractiveness of this position derives from the fact that it is neither embarrassed by the dynamical nature of general relativistic spacetime nor by the infamous hole argument that plagues the traditional manifold substantivalist (Earman and Norton, 1987). However,

structural realism seems to be threatened, of all things, by symmetries. A relational structure that exhibits a high degree of symmetry is in general unable to perform the task that the structuralist bestows upon it, namely to individuate the objects instantiating the relations. In the context of spacetime theory, (Wüthrich, 2009) has spelled out this argument to formulate what he calls the "abysmal embarrassment" for the spacetime structuralist. What has gone wrong? It seems to me that while structural realism has matured into a comprehensive metaphysical framework, it has not quite managed to shake off the legacy of its empiricist provenance and has not paid sufficient attention to the question of fundamentality.

Baptiste Le Bihan (University of Geneva). All the Way Down into the Non-Spatial. "Space does not exist fundamentally: it emerges somehow from a more fundamental non-spatial structure". This intriguing claim appears in various approaches to quantum mechanics and quantum gravity. The goal of the talk is to show this apparent emergence does not commit to a stratified picture of the natural world with levels of reality. Trans-categorical mereology, as developed by L.A. Paul (2002, 2012), may be used to interpret space and spacetime emergence in the background of a flat ontology. We can make sense of space emergence without subscribing to a picture of the natural world stratified in layers of reality, the non-spatial layer being more fundamental than the spatial one. The view will be described in relation to two particular research programs: wave function realism and loop quantum gravity.

Olivier Lemeire (KU Leuven). The Causal Structure of Natural Kinds. Most realist theories of natural kinds contain the causal ground hypothesis. This hypothesis has two components; (1) that all natural kinds are causally grounded, and (2) that the epistemic fertility of natural kinds crucially depends on them being causally grounded. Recently, Matthew Slater has challenged this hypothesis, arguing that natural kinds are counterfactually stable clusters of properties, and that this analysis is sufficient to explain their epistemically fertility. In response, I argue that one cannot understand the epistemic fruitfulness of kinds without understanding their causal structure. Not only is the success of kind-based reasoning often based on understanding their causal structure, but more importantly, certain causal structures support kind-based reasoning better than others. Interestingly, a common cause structure is most likely to make a kind apt to support both inductive projections and explanations, but each for a quite different structural reason.

Alan Love (University of Minnesota). What Is a Conserved (Genetic) Mechanism? The "conservation" of molecular genetic mechanisms is central to the reasoning practices of contemporary developmental biology, such as deriving explanatory generalizations from model organisms, and is a major source of its recent success in elucidating how animals and plants develop. However, conserved molecular genetic mechanisms are not identical and therefore a question arises about how deep the similarities must be to license these inferences. Additionally, mechanisms are individuated by the outcomes they produce. Since the claim of conservation is a judgment of homology, which is typically based on structure rather than function, what constitutes the individuation con-

ditions for a conserved mechanism? I address these questions in the context of philosophical literature on mechanisms with an example from insect segment formation. This analysis identifies a further, neglected issue about the dynamic constitution and organization of molecular genetic mechanisms during ontogeny.

CASEY MCCOY (EDINBURGH UNIVERSITY). AN OBJECTIVIST'S GUIDE TO OBJECTIVE CHANCE. Several philosophers have developed accounts to dissolve the apparent conflict between deterministic laws of nature and objective chances. These philosophers advocate the compatibility of determinism and chance. I argue that determinism and chance are incompatible and criticize the various notions of "deterministic chance" supplied by the compatibilists. Many of the compatibilists are strongly motivated by scientific theories where objective probabilities are combined with deterministic laws, the most salient of which is classical statistical mechanics. I show that, properly interpreted, statistical mechanics is either an indeterministic theory or else its probabilities are not chances, just as incompatibilism demands.

ROBERT MICHELS (UNIVERSITY OF GENEVA). ESSENTIALISM AND CONTINGENT EXISTENCE CLAIMS. Essentialism is the view that metaphysical necessity is definable in terms of essence. Standard versions of the Essentialist definition of necessity involve the logical closure of the set of all essential truths. This allows the definition to account for certain logically complex metaphysical necessities, but if the relevant notion of logical consequence is classical, this also entails that the definition mis-classifies some clearly contingent existence claims as metaphysically necessary. In this talk, I discuss whether this problem can be avoided without adopting a non-classical notion of logical consequence. In particular, I argue that the conditionalization-strategy, which has been adopted by some philosophers in order to avoid a similar problem, fails to solve the mis-classification problem.

ZEE PERRY (RUTGERS UNIVERSITY). MOTIVATING A DYNAMIC THEORY OF QUANTITY. Let a dynamic theory of mass be one on which all it is for X and Y to stand in a particular mass ratio (e.g. "4.8-times as massive as") is for them to behave a certain way in accordance with the dynamical laws (e.g. in worlds governed by "F = ma", Y will accelerate at 4.8-times the rate of X if they're impressed by forces of equal strength). This talk argues that a dynamic theory of mass in terms of spatiotemporal quantities is both theoretically fruitful, and motivated by considerations from physics. First, I show how dynamic accounts solve a difficult puzzle in the metaphysics of quantity concerning the possibility of under-populated worlds. After that, I argue that the way dynamical laws treat quantities like mass and length at different possible worlds strongly suggests both that (1) mass is dependent, for its structure, on length and temporal duration, and (2) this dependence obtains only in virtue of the dynamical laws being what they are.

EMILY PRYCHITKO (WASHINGTON UNIVERSITY, ST. LOUIS). ESTABLISHING CONSTITUTIVE RELEVANCE IN MECHANISMS. Craver's (2007) mutual manipulability account of constitutive relevance fi the most popular account by which to identify the components of mechanisms fi has recently been shown to face a major problem: nothing can meet its criteria, so it fails to iden-

tify anything as a component of a mechanism (Baumgartner and Gebharter 2015). Some have offered reconstructions of Craver's account in order to fix the problem, but these have created further problems, such as entailing interlevel causation. I offer a new account of constitutive relevance with which we can identify components by situating them on the causal chain between the mechanism's input and output, without having to accept interlevel causation. This 'causal situationist' account of constitutive relevance does not face the problems of Craver's account (or others' reconstructions of it) and is satisfying both theoretically and descriptively.

Christian Sachse (University of Lausanne). Multiple Realization and Biological Function Made Compatible with the Subset Approach and Ontological Reductionism. This paper defends an overall reductionist perspective that is non-eliminativist. To achieve this aim, key arguments are combined from several different debates, particularly regarding ontological reductionism, the subset approach, biological functions, constitutive explanations, multiple realization, and theory reduction. The resulting combination will ground three claims. I) If ontological reductionism is granted, then the notion of biological function is best understood as being about subsets of physical causal powers. II) If ontological reductionism and a subset understanding of biological functions are granted, then this actually does not exclude the possibility of constitutive explanations and multiple realization. III) If ontological reductionism and a subset understanding of biological functions, constitutive explanations, and multiple realization are granted, then a strong defense of the explanatory autonomy of biology can be achieved through a theory-reductionist framework.

Kian Salimkhani (University of Bonn). Constraining Inductive Metaphysical Inferences by Help of Internal Unification. Positive metaphysical inferences in the context of the research program of Inductive Metaphysics seem to require additional constraints as, for example, unification. Typically, this is understood as a residual of a priori reasoning. Although Inductive Metaphysics is not strictly opposed to such reasoning in general, a priori elements do seem odd in this context. But does unification really refer to a priori reasoning? In this paper, I challenge the widespread conviction that unification in physics relies on external constraints (e.g. metaphysical or metatheoretical assumptions) and argue that paradigmatic examples of unification rather prove to be a by-product of genuine physical research itself. Accordingly, unification can be explained internally. This view better meets the overall approach of Inductive Metaphysics. To support my claim, I will investigate different instances of unification in physics.

Orly Shenker (Hebrew University of Jerusalem) and Meir Hemmo (University of Haifa). The Past Hypothesis and the Psychological Arrow of Time. It is a psychological fact that we experience a temporal direction. Recent (and less recent) attempts to explain this psychological fact turn to various aspects of the second law of thermodynamics. We distinguish between two kinds of such attempts, and argue that they stem from two conceptually independent hypotheses (namely, the past hypothesis and the ready state hypothesis), which are in effect solutions to two different problems in statistical mechanics (namely,

the minimum entropy problem and the retrodiction problem). We show that the two approaches entail different hypotheses concerning the features of brain states that are to be associated with the psychological temporal arrow. In the literature these two approaches are sometimes treated as a single explanation under the heading of 'past hypothesis'. We show that this is mistaken and leads to confusion. Finally, we argue that both approaches are neither necessary nor sufficient for explaining the psychological arrow of time.

MATTHEW SLATER (BUCKNELL UNIVERSITY). REALISM AND UNDERSTANDING: THE CHALLENGE FROM PLURALISM. Pluralism poses a prima facie problem for the metaphysical and semantic tenets of Scientific Realism: how, if there are many cross-cutting ways of classifying reality, can it be that our best scientific theories, "taken at face value", truly describe reality? Drawing on recent work by Waters, Chang, and Elgin, I argue that shifting our focus from knowledge to understanding in our characterization of Scientific Realism allows for a solution to this challenge that ought to be acceptable to a (modest) realist. Understanding, unlike knowledge, is non-factive and thus allows room for multiple ways for our theories to "tether" to the world.

TUOMAS E. TAHKO (UNIVERSITY OF HELSINKI). WHERE DO YOU GET YOUR PROTEIN? OR: BIOCHEMICAL REALIZATION. Biochemical kinds such as proteins pose interesting problems for philosophers of science. They can be studied both from the point of view of biology and chemistry, but these different perspectives may result in different classificatory practices. I will examine the tension that such classificatory differences produce. We will see that the reducibility of the biological functions of biochemical kinds to the chemical structures that realize these functions is a key question here. This leads us to a more general discussion of multiple realizability and realization at the biology-chemistry interface. The conclusion is that genuine multiple realization may be rare at this interface.

PETER TAN (UNIVERSITY OF VIRGINIA). COUNTERPOSSIBLE NON-VACUITY IN SCIENTIFIC PRACTICE. Part of the received wisdom regarding the counterfactual conditional is that counterfactuals with metaphysically impossible antecedents – "counterpossibles" – are indiscriminately vacuously true. This paper presents a new argument that this received wisdom must be rejected. After reviewing the various precedents in favor of the orthodoxy, I show that non-vacuously true and false counterpossibles appear when providing scientific explanations, when reasoning with idealized models, and when evaluating the content of false historical theories. In other words, scientific practice routinely treats counterpossibles as non-vacuously true and false. The philosophical orthodoxy must therefore be rejected: it is incompatible with scientific practice, and threatens to declare that some paradigm uses of the counterfactual conditional in science are nonsense.

NEIL E. WILLIAMS (UNIVERSITY OF BUFFALO). POWERS AND BSB LAWS. This paper proposes a hybrid account of the laws of nature that is suitable for a systematic metaphysic based on a fundamental ontology of irreducible causal powers. That hybrid combines lawlessness, as given by the internal causal blueprint all powers carry, with a best-system analysis (BSA)

that ranges over the actual distribution of properties. I call the combination the 'best-system/blueprint' (BSB) account of laws. Motivation, justification, and a nearby rival are discussed.

Alastair Wilson (University of Birmingham). How Physics Might Undercut Fine-Tuning. In the context of the fine-tuning probabilistic argument for the existence of a divine designer (FTA), the appeal to the existence of a multiverse has seemed problematically ad hoc. The situation looks rather different, though, if we have independent evidence from physics for a multiverse. I will argue that independently-motivated multiverses can be undercutting defeaters for the FTA, but that whether one in fact undercuts the argument depends on open questions in fundamental physics and cosmology. I will also argue that Everettian quantum mechanics opens up new routes to undercutting the FTA, although by itself it is insufficient to undercut it. The interpretation of quantum mechanics thus turns out to be potentially evidentially relevant to the existence of a divine designer.

Justin Zylstra (University of Alberta). Essence and Grounding Connections. I extend Kit Fine's truthmaker semantics and outline a semantics for essence. The truthmaker semantics incorporates a semantic conception of making true for which there is a metaphysical correlate dating back to Aristotle's Categories. My semantics for essence in addition incorporates a semantic conception of making to be what it is for which there is a metaphysical correlate dating back to Aristotle's Metaphysics. I use the semantics to argue that there is no strict grounding connection between an essentialist truth and its prejacent.

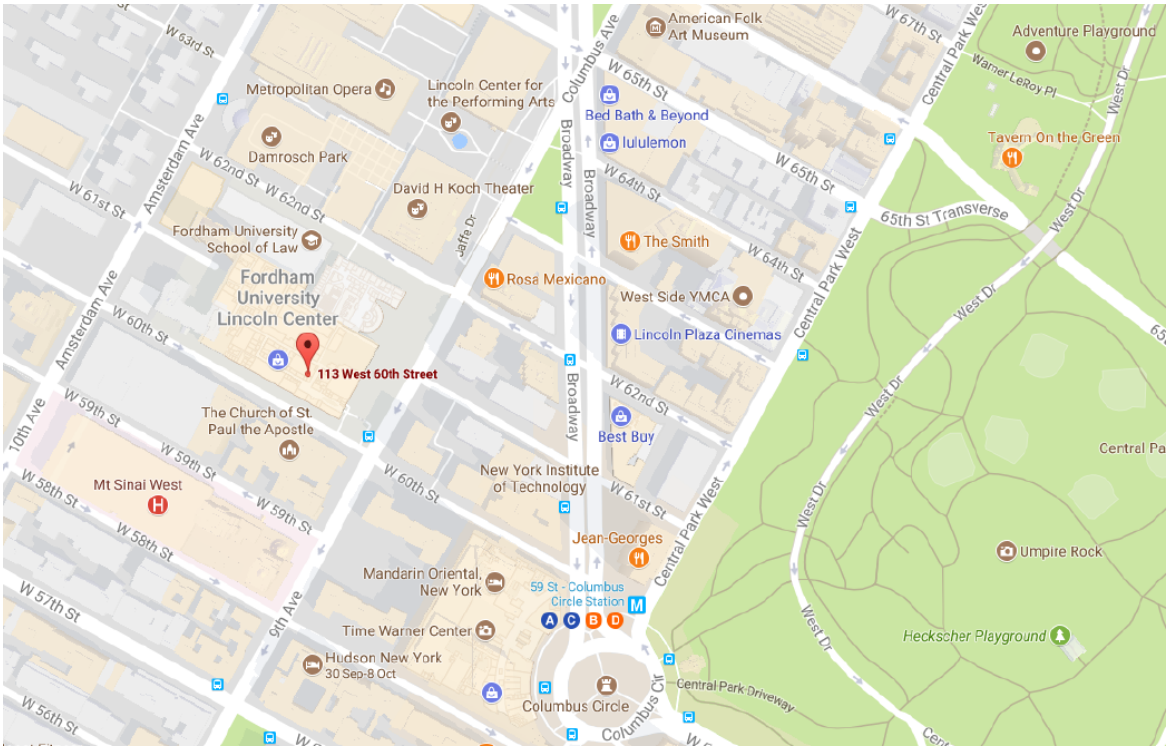
Practicalities

Location

SMS3 takes place at the Lincoln Center campus of Fordham University, New York, NY 10023. Most sessions will be in the Lowenstein Building, 113 W. 60th Street, located at the corner of 60th Street and Columbus Ave. The building entrance faces Columbus Ave. The directions to the rooms in the program are as follows.

Lowenstein 514 When you enter the Lowenstein Building from Columbus Ave, proceed past the security desk and take the escalator up to the Plaza Level. Take the elevator to the 5th Floor.

12th Floor Lounge When you enter the Lowenstein Building from Columbus Ave, proceed past the security desk and take the escalator up to the Plaza Level. Take the elevator to the 11th Floor. When you reach the 11th Floor, walk up the stairs to the 12th Floor Lounge. (Note: three elevators do go directly to the 12th Floor, but most stop at the 11th.)



SOUTH LOUNGE When you enter the Lowenstein Building from Columbus Ave, proceed past the security desk and take the escalator up to the Plaza Level. Walk past the elevators through the cafeteria entrance. The door to the South Lounge is at the far end of the cafeteria.

MCNALLY AMPHITHEATRE, 140 W 62ND STREET This building is accessible from Lowenstein via an underground tunnel. When you enter the Lowenstein Building from Columbus Ave, proceed past the security desk, turn right down the corridor before reaching the escalators. At the end of the corridor turn left and make a quick right down a second corridor. At the end of this corridor turn right, and then make a left through the doors into Platt Court. The entrance to McNally is off Platt Court.

140 W 62ND STREET, ROOM 214 This building is accessible from Lowenstein via an underground tunnel. When you enter the Lowenstein Building from Columbus Ave, proceed past the security desk, turn right down the corridor before reaching the escalators. At the end of the corridor turn left and make a quick right down a second corridor. At the end of this corridor turn right, and then make a left through the doors into Platt Court. Proceed across Platt Court and take the stairs at the far end to the 2nd floor.

TRAVEL

The Lincoln Center campus is easily accessible by *subway*, *bus*, and *car*.

SUBWAY The A, B, C, D, 1, and 9 subway trains all stop at 59th Street/Columbus Circle, one block east of campus. A subway map is available on the MTA website.

BUS For local bus service take the M5, M7, M10, M11, M31 M57, or M104. All stop close to Columbus Circle or the Lincoln Center for the Performing Arts. A bus map is available on the MTA website.

DRIVING FROM POINTS NORTH VIA THE GEORGE WASHINGTON BRIDGE/95 Join the Henry Hudson Parkway (Westside Highway) South. Exit at 79th Street. (Boat Basin). At the second traffic light, turn right onto West End Avenue. Continue south to 65th Street and turn left. Turn right onto Columbus Avenue. Keep to the left of Columbus Avenue and turn left onto 61st Street. A public parking garage is on the right. The main entrance to the University is across Columbus Avenue at the corner of 60th Street.

DRIVING FROM POINTS WEST VIA THE LINCOLN TUNNEL Take I-78 East to the New Jersey Turnpike North. Exit at the Lincoln Tunnel, #16E. Follow signs uptown. At 41st Street turn left. Turn right onto 10th Ave. to 62nd Street. Turn right onto 62nd Street. The School of Law is on the right near the corner of Columbus Avenue. A public parking garage is located on your left on 62nd Street across from the School of Law. To reach the main entrance of the Lincoln Center campus, proceed on 62nd Street to Columbus Avenue and turn right. Keep to the left side of Columbus Avenue and turn left onto 61st Street. A public parking garage is on the right. The main entrance to the University is across Columbus Avenue at the corner of 60th Street.

DRIVING FROM POINTS SOUTH VIA THE LINCOLN TUNNEL Take Parkway North to Exit 142 (Union Tollbooth). Go to far right toll

booths of Exit 142 for I-78 East. Follow I-78 East to the New Jersey Turnpike North. Exit at the Lincoln Tunnel, #16E. Follow signs uptown. At 41st Street turn left. Turn right onto 10th Ave. to 62nd Street. Turn right onto 62nd Street. The School of Law is on the right near the corner of Columbus Avenue. A public parking garage is located on your left on 62nd Street across from the School of Law. To reach the main entrance of the Lincoln Center campus, proceed on 62nd Street to Columbus Avenue and turn right. Keep to the left side of Columbus Avenue and turn left onto 61st Street. A public parking garage is on the right. The main entrance to the University is across Columbus Avenue at the corner of 60th Street.

Driving from East Side Queensboro Bridge, Midtown Tunnel. Uptown to 66th Street and turn right. Transverse through Central Park. Continue on 66th Street to Columbus Avenue. At Columbus Avenue, turn left. Keep to the left of Columbus Avenue and turn left at 61st Street. A public parking garage is on the right. The main entrance to the University is across Columbus Avenue at the corner of 60th Street.

Driving from Brooklyn Brooklyn Queens Expressway to Brooklyn Battery Tunnel. Out of the tunnel, bear left, then turn right onto West Street. Follow West Street to the Henry Hudson Parkway North (West Side Highway). Exit at 54th Street. Take 10th Avenue uptown to 62nd Street. Turn right onto 62nd Street. The School of Law is on the right near the corner of Columbus Avenue. A public parking garage is located on 62nd Street across from the School of Law. To reach the main entrance to the rest of the Lincoln Center campus, proceed on 62nd Street to Columbus Avenue and turn right. Keep to the left side of Columbus Avenue and turn left onto 61st Street. A public parking garage is on the right. The main entrance to the University is across Columbus Avenue at the corner of 60th Street.

Driving from Long Island Long Island Expressway to the Midtown Tunnel, to 34th Street West. Turn right onto 10th Avenue. Take 10th Avenue uptown to 62nd Street. Turn right onto 62nd Street. The School of Law is on the right near the corner of Columbus Avenue. A public parking garage is located on 62nd Street across from the School of Law. To reach the main entrance to the rest of the Lincoln Center campus, proceed on 62nd Street to Columbus Avenue and turn right. Keep to the left side of Columbus Avenue and turn left onto 61st Street. A public parking garage is on the right. The main entrance to the University is across Columbus Avenue at the corner of 60th Street.

Other Additional information about airport transportation as well as other forms of public transportation is available on the Port Authority of New York and New Jersey website.

Parallel Sessions

Each slot in the parallel sessions will be so organized: presentations will be 30 minutes, with a 10 minutes comment, a 5 minutes reply, and 15 minutes for Q&A. Speakers and commentators are advised to bring a computer to plug into the university projection system, if they wish to use Powerpoint, etc. It would be easiest for speakers and commentators in the same slot to agree beforehand to use a single computer wherein both

sets of Powerpoint slides, if they are to be used, can be loaded. This will save time on set up and enable more time for philosophy.

Food

There are numerous eating establishments within a few blocks of campus. They include everything from simple lunch counters and coffee shops to very fine restaurants. There are also several cafeterias and a coffee shop within the Law School building itself.

Lodging

Fordham receives special rates from the hotels below. Each is within easy walking distance of campus (2-3 blocks). If you make reservations with one of them, be sure to tell them you are attending a Fordham event and ask to receive the Fordham rate.

The Empire Hotel
44 West 63rd Street
New York, NY 10023
212.265.7400
www.empirehotelnyc.com

The Hudson Hotel
356 West 58th Street
New York, NY 10019
800.697.1791
www.hudsonhotel.com

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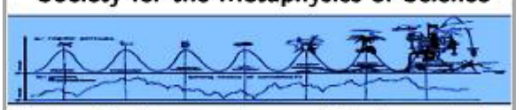

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