UNIVERSITY OF BUCHAREST FACULTY OF PHILOSOPHY DEPARTMENT OF THEORETICAL PHILOSOPHY

CELFIS seminar, 17.11.2014

18:00-19:30 Samuel Fletcher (Munich) "The Topology of Intertheoretic Reduction"

Butterfield has recently presented a case for the compatibility of reduction and emergence in some of the exact sciences. He takes reduction to be given by one theory being the limit of another, and emergence to be "novel and robust behavior" arising "on the way to the limit." Here I aim to make this idea more precise, emphasizing the necessary role of *similarity relations* between the models of the two theories, encoded formally by a choice of topology on them. I stress that *justifying* why a notion of similarity is appropriate is crucial, as it may perform much of the work in demonstrating a particular reduction's success or failure, and in explicating the sense of "novel and robust behavior" of a candidate emergent property. To illustrate, I consider the case of gravitational theory, and the emergence of features like "objective simultaneity".

Half-day Workshop, 18.11.2014

16:00-17:15 Slobodan Perovic (Belgrade) "The Higgs Boson and the Logic of Scientific Discovery"

Several physicists, including Steven Weinberg, have recently suggested that the inescapable logic of discovery forces us to build mega-experiments at high energies (e.g. Large Hadron Collider at CERN) if we wish to tackle the fundamental levels of the physical world (e.g. recently discovered Higgs boson). Yet the nature of theoretical and physical constraints in high energy physics, and technological obstacles stemming from them, turn out to be surprisingly open-ended. I demonstrate that an appeal to the logic of scientific discovery in this case is circular and self-serving, and suggest instead an epistemological and historical argument for a very broad principle governing the discovery process.

Background reading: Philip Kitcher, "The Division of Cognitive Labor" in *The Journal of Philosophy*, 87, 5-22.

17:30-18:45 Samuel Fletcher (Munich) "On the Local Flatness of Spacetime"

Many discussions of the foundations of general relativity put a special emphasis on describing every relativistic spacetime as “locally flat,” or as “locally Minkowskian”. Such claims are prima facie puzzling: after all, curvature is itself a local property, being described by a tensor field on spacetime. In general, relativistic spacetimes have non-vanishing curvature, so there is a straightforward sense in which they are not locally flat. Still, there is a natural intuition behind claims of “local flatness” arising from analogy with a sufficiently small region of a curved surface, like that of the Earth, which can to a good approximation be described as planar. But like many “principles” of general relativity, there does not seem to be much consensus regarding how to make this intuition more precise. Without attempting a comprehensive survey, we note three common articulations of what it could mean for spacetime to be “locally flat” or “locally Minkowskian,” arguing that each of them is unsatisfactory. We then explore a different, but precise and coordinate-independent sense in which relativistic spacetimes might be described as (approximately) locally flat. (This talk is based on joint work with Jim Weatherall.)

Background reading: Eleanor Knox, "Effective Spacetime Geometry" in *Studies in History and Philosophy of Modern Physics*, 44, 346-356.

CELFIS Seminar, 19.11.2014

18:00-19:30 Slobodan Perovic (Belgrade) “Niels Bohr’s Complementarity and the Experimental Method”

There is a strong undercurrent of Baconian induction in Bohr’s approach to physical phenomena. His complementarity was induced from relevant experiments and shunned hasty metaphysical generalizations, contrary to some dominant interpretations. Bohr’s view of observations as classical is the basis of such induction, while the wave/particle duality its natural outcome. Such analysis clarifies the context of early Schrödinger’s critique of complementarity, while pointing out a difficulty related to quantum entanglements Bohr's account faces.

All events will take place in Splaiul Independentei 204, Sala Doctorate. For more information, please contact Iulian Toader at ditoader@gmail.com.