AGPhil 1: Symmetry and Geometry

Time: Monday 11:00–13:00 Location: AGPhil-H14

AGPhil 1.1 Mon 11:00 AGPhil-H14

A Proposal for a Metaphysics of Self-Subsisting Structures — •Antonio Vassallo[1] and Pedro Naranjo[1,2] — [1]Faculty of Administration and Social Sciences, Warsaw University of Technology, Plac Politechniki 1, 00-661 Warsaw, Poland — [2]Faculty of Philosophy, University of Warsaw, Krakowskie Przedmieście 3, 00-047 Warsaw, Poland

We present a new metaphysical framework for physics that is conceptually clear, ontologically parsimonious, and empirically adequate. This framework relies on the notion of self-subsisting structure, that is, a set of fundamental physical elements whose individuation and behavior are described in purely relational terms, without any need for a background spacetime. Although the specification of the fundamental elements of the ontology depends on the particular physical domain considered –and is thus susceptible to scientific progress–, the structural features of the framework are preserved through theory change. The kinematics and dynamics of these self-subsisting structures are technically implemented using the theoretical framework of Pure Shape Dynamics, which provides a completely relational physical description of a system in terms of the intrinsic geometry of a suitably defined Riemannian space, called shape space.

AGPhil 1.2 Mon 11:30 AGPhil-H14

Arguments from scientific practice in the debate about the physical equivalence of symmetry-related models — •Joanna Luc — Jagiellonian University, Kraków, Poland

In the recent philosophical literature, several counterexamples to the interpretative principle that symmetry-related models are physically equivalent have been suggested (Belot 2013, Belot 2018, Fletcher 2020). Arguments based on these counterexamples can be understood as arguments from scientific practice of roughly the following form: because in scientific practice such-and-such symmetry-related models are treated as representing distinct physical situations, these models indeed represent distinct physical situations. I will argue that if we are exclusively interested in models understood as representing entire possible worlds (not their subsystems), arguments from scientific practice should involve some additional assumptions to guarantee that they are relevant for models understood in this way. However, none of the examples presented in the literature satisfy all these additional assumptions, which leads to the conclusion that arguments from scientific practice based on these examples do not undermine the interpretative principle that different symmetry-related models represent the same possible world. An important ingredient of my argumentation is the distinction between implicit and explicit modes of representing in physics; symmetry-related models understood as representing subsystems are in some contexts physically inequivalent only because they represent implicitly some physical object (associated with a reference frame).

AGPhil 1.3 Mon 12:00 AGPhil-H14

A new view of the history of electromagnetic theory. An alternative formulation to Maxwell — •antonino drago — via Benvenuti 3, 56011 Calci, Italy

The exceptional role played by electromagnetic theory within the history of classical physics is stressed and characterized. The notion of incommensurability between different approaches explains why this case-study constitutes a hard subject for the historians of physics and hence why in the past they were content to consider as the decisive event of this history the birth of Maxwell equations. The usual historical account on the completion of electromagnetic theory is contested; electromagnetic theory has to be considered a completed theory not before the requirement of a symmetric explanation of electromagnetic induction between moving bodies was fulfilled. Actually in a retrospective view from the introduction of Lorentz*s group some scholars have suggested new foundations of electromagnetism. Among these new foundations I recognize in a recent one (Diener et al. 2013) a substantial anticipation of an alternative formulation to Maxwell-Hertz-Lorentz one. I improve it in a formal way according to an interpretation of the foundations of the electromagnetism as constituted by the choices on two basic dichotomies: one about two kinds of mathematics, and another about two kinds of logic.

AGPhil 1.4 Mon 12:30 AGPhil-H14

The Spatially of the Universe in Einstein*s paper *Geometry and Experience* — •Taimara Passero — University of São Paulo, São Paulo, Brazil.

The aim of this talk is to present and discuss the role of Euclidean geometry in Einstein*s argument concerning the spatially of the Universe. Albert Einstein analyzes this topic in the paper *Geometry and Experience*, given as a public address on January 27, 1921 at the Prussian Academy of Sciences. In the first part of his paper, Einstein distinguishes between *purely axiomatic geometry* and *practical geometry*. In the second part, Einstein discusses whether the Universe is spatially finite or not. He presents a beautiful argument to illustrate the theory of a finite Universe by means of a mental picture using his notion of practical geometry. To obtain this, Einstein goes from the thinking and visualization offered by Euclidean geometry to acquire a mental picture of the spherical geometry. This process leads him to conclude that *the human faculty of visualization is by no means bound to capitulate to non-Euclidean geometry*.