AKPhil 2: Cosmology 2

Zeit: Dienstag 15:15–16:15 Raum: KIP SR 3.401

AKPhil 2.1 Di 15:15 KIP SR 3.401

What is a gravitational field? — •Dennis Lehmkuhl — Faculty of Philosophy, Oxford University

It is often claimed that the theory of General Relativity (GR) shows that what we perceive as gravity is "in fact" just a consequence of the geometry of spacetime. Others claim that the very core of GR is that it actually gives an account of the gravitational field, an account which unifies the latter with the inertial field (sometimes also called the guidance field) such that the theory postulates the existence of a single gravito-inertial field. I will briefly review these apparently contradicting interpretations of GR, and discuss whether they do indeed exclude one another. This will lead me on to ask: "What is a gravitational field in GR?"; or more precisely: "What is the mathematical representative of the gravitational field in GR?" Some have argued that the curvature tensor should be seen as representing the gravitational field (most prominently Synge), others claim that the connection is the gravitational field's mathematical representative (e.g. Ehlers and Giulini). Both possibilities have in common that they presuppose the standard formulation of GR; nevertheless, there are striking conceptual differences between the proposals. After reviewing these differences, I will discuss a number of topics which could throw some new light on the issue; most importantly the similarity/dissimilarity between gravitational waves and electromagnetic waves, and the role GR plays as compared to non-metric gravitational theories on the one hand, and bimetric theories on the other hand.

AKPhil 2.2 Di 15:45 KIP SR 3.401

Old Temptation in New Outfit: The Anthropic Cosmological Principle and the Teleological Tradition — •Michael Stöltzner — IZWT, Universität Wuppertal, Gaußstr. 20, D-42119 Wuppertal

Looking at the parameters that determine the characteristics of our Universe, cosmologists keep wondering why minute variations in these values yield so markedly different scenarios. For those, who eschew multiverse cosmology, the anthropic principle (AP) seems to provide an explanation: these values are such because they are, or even must be, consistent with the existence of human observers. The concrete form of the AP ranges from a truism of confirmation theory to a metaphysical assumption comparable to design arguments. In the latter form, so I argue, the AP simply rehearses a type of teleological thinking that has been with us since the classical debates between Isaac Newton and Richard Bentley. It implicitly assumes that a physical theory is categorical, that is, leaves no further freedom in selecting physical models once its basic laws are in place. But almost all physical theories fall short of this ideal. Model selection is guided by the likelihood of empirical data given a certain assumption. It is precisely at this point where the cosmological AP has emerged in the 1970s. I argue that in this form the AP makes sense as an explanatory complement but it cannot be elevated to the general level it purportedly dwells on.