AGPhil 4: Spacetime Thoeries

Time: Wednesday 9:30–11:00 Location: H 2033

AGPhil 4.1 Wed 9:30 H 2033

The difference between matter and spacetime — •Dennis Lehmkuhl — IZWT, Universität Wuppertal, Gausstrasse 20, 42119 Wuppertal

The possession of mass is widely accepted as a necessary condition for something to be a material systems in Newtonian physics. I argue that the property "possession of mass-energy-momentum" should be seen as the natural heir of the property "possession of mass" in the context of relativistic theories. Hence, possession of mass-energy-momentum (energy for short) should be counted as a necessary condition for something to be a material systems in these theories. However, we also know that gravitational waves, waves of curvature in spacetime, can possess energy, so that the question has to be posed whether gravitational waves and thus spacetimes should be counted as material systems as well. There are many definitions of gravitational energy in general relativity, all of them involving a kind of non-locality. But more importantly, all these definitions are such that gravitational/spacetime energy can only be defined for certain kinds of spacetimes. Having argued for seeing energy as a necessary condition for somethin to be a material system, I claim that spacetimes cannot be counted as material systems in GR. The theory thus leaves us with a fundamental dichotomy between spacetime and matter. I conclude with a brief discussion of whether this dichotomy might be hoped to be overcome by modifications or extensions of GR.

AGPhil 4.2 Wed 10:00 H 2033

On how to gain Insights into the Dimensionality of Space and Time — •Radin Dardashti — London School of Economics, London, UK

The dimensionality of space is seemingly such a fundamental aspect of our everyday life that doubting its tri-dimensionality may seem strange and arguing for it seems to be a trivial issue. Many arguments, mainly introduced by physicists, go even further and state that their argument offers an explanation of the dimensionality. This is, we believe, not at all a trivial issue.

But rather than dealing in detail with the proposed arguments, a more general approach has been chosen. First, we restrict ourselves to mathematics and physics from which we hope to gain insights about the dimensionality. Second, possible methodological approaches to the question are developed and analyzed by considering examples ranging from the mathematical theory of Clifford Algebras to the physical theory of Superstrings. This is followed by a philosophical discussion of the argument structures that follow from these approaches. Finally, we discuss in what sense the arguments could be considered to be explanatory arguments.

AGPhil 4.3 Wed 10:30 H 2033

Is Lorentz's Ether Theory Suited to Ground the Privilege of the Present — •Thorben Petersen — Institut für Philosophie, Universität Bremen

On the so-called Lorentzian interpretation of relativistic effects, it is assumed that there is ether compensation, which brings it about that electromagnetic and kinematic phenomena are both Lorentz invariant even though the underlying space-time is Newtonian. According to Einsteins special theory of relativity, by contrast, Lorentz invariance reflects a different kind of default space-time behaviour (the space-time being Minkowskian). A crucial difference is that unlike Einsteins interpretation the Lorentzian interpretation retains an absolute relation of simultaneity. Prima facie this makes it attractive to those who think that the present is ontologically privileged, for it seemingly allows to maintain that one need not relativize the present to different inertial frames of reference. The aim of this talk is to cast doubt on this assumption. I argue that one faces serious semantical, epistemological and metaphysical problems upon combining Lorentzianism with the claim that the present is ontologically privileged.