

Philosophy and History of Physics

Initiative: Lichtenberg - Professuren

Bewilligung: 14.06.2018

Laufzeit: 5 Jahre

Projekt-Website: https://www.history-and-philosophy-of-physics.com

Integrated philosophy and history of physics analyses both the historical development and the conceptual structure of physics. The professorship focuses on the foundations of theories of space, time, and gravity. The most succesful theory in this domain is still Einstein's general theory of relativity (GR). However, important concepts that are now crucial for the understanding of both the theory and the universe it aims to describe have only been created in the last few decades; this applies in particular to the description of black holes and gravitational waves, which were experimentally discovered in 2015. The international community of history and philosophy of physics is only just beginning to engage with these developments. The professorship wants to close this gap by pursuing three interrelated projects. The first project explores Einstein's own interpretational and conceptual work on GR in the 25 years after he had found the Einstein field equations, the fundamental law of gravity at the core of the theory, in 1915. The second project investigates the solution space of the Einstein equations, and how different solutions are applied especially to describe black holes and gravitational waves. The third project looks at the counterparts of these solutions in alternative theories of gravity, in an effort to see how special GR is as an inhabitant of the 'space of spacetime theories'.

Projektbeteiligte

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Open Access-Publikationen

The genesis of Einstein's work on the problem of motion in general relativity. Dark Matter = Modified Gravity? Scrutinising the spacetime-matter distinction through the modified gravity / dark matter lens Some Other No Hole Spacetimes Properties Are Unstable Too A family of horizon-penetrating coordinate systems for the Schwarzschild black hole geometry with Cauchy temporal functions

