GR 1: Hauptvorträge Montag: Moderne Aspekte der Relativitätstheorie (gemeinsam mit der jDPG)

Zeit: Montag 9:10–10:40 Raum: JUR K

Hauptvortrag GR 1.1 Mo 9:10 JUR K

Thermodynamics and Brownian motion in special relativity — •Jörn Dunkel[1], Peter Hänggi[2], and Stefan Hilbert[3] — [1]Rudolf Peierls Centre for Theoretical Physics, University of Oxford, 1 Keble Road, Oxford OX1 3NP, United Kingdom — [2]Institut für Physik, Universität Augsburg, Universitätsstrasse 1, D-86135 Augsburg, Germany — [3]Argelander-Institut für Astronomie, Universität Bonn, Auf dem Hügel 71, D-53121 Bonn, Germany

The unification of relativity and thermodynamics has been a subject of considerable debate over the last 100 years. The reasons for this are twofold: (i) Thermodynamic variables are nonlocal quantities and, thus, single out a preferred class of hyperplanes in spacetime. (ii) There exist different, seemingly equally plausible ways of defining heat and work in relativistic systems. These ambiguities led, for example, to various proposals for the Lorentz transformation law of temperature. Traditional isochronous formulations of relativistic thermodynamics are neither theoretically satisfactory nor experimentally feasible. We will discuss how these deficiencies can be resolved by defining thermodynamic quantities with respect to the backward-lightcone of an observation event [1]. The second part of the talk concerns the question how Brownian motion processes can be generalized within the framework of special relativity [2].

[1] J. Dunkel, P. Hänggi and S. Hilbert, Nature Physics 5:741, 2009
[2] J. Dunkel and P. Hänggi, Physics Reports 471(1): 1, 2009.

Hauptvortrag GR 1.2 Mo 9:55 JUR K

Nonlocal Gravity Simulates Dark Matter — •Friedrich W. Hehl[1] and Bahram Mashhoon[2] — [1]University of Cologne and University of Missouri, Columbia, MO — [2]University of Missouri, Columbia, MO

A nonlocal generalization of Einstein's theory of gravitation is constructed within the framework of the translational gauge theory of gravity. In the linear approximation, the nonlocal theory can be interpreted as linearized general relativity but in the presence of "dark matter" that can be simply expressed as an integral transform of matter. It is shown that this approach can accommodate the Tohline-Kuhn treatment of the astrophysical evidence for dark matter.—

F.W.Hehl and B.Mashhoon, Phys.Rev.D79 (2009) 064028.