GR 4: Klassische Allgemeine Relativitätstheorie

Zeit: Dienstag 14:00–15:20 Raum: KGI-HS 1010

GR 4.1 Di 14:00 KGI-HS 1010

Nonlinear effects of Einstein equations in the weak-field regime — •Nikodem Szpak — Albert-Einstein-Institut, Max-Planck-Institut für Gravitationsphysik, Golm

Einstein equations are essentially nonlinear. Even in the weak-field regime, like small perturbations of a static background, nonlinear effects show up. We discuss examples of such phenomena like late-time tails or distortion of travelling waves appearing solely due to the nonlinearity and being absent in the linear approximation.

GR 4.2 Di 14:20 KGI-HS 1010

On the initial value problem of the Maxwell-Lorentz equations — •Volker Perlick — Physics Department, Lancaster University, Lancaster LA1 4YB, United Kingdom

I am considering the coupled equations of motion for a charged dust and an electromagnetic field (Maxwell-Lorentz equations) on a general-relativistic spacetime. After decomposing the system of differential equations into evolution equations and constraints I am establishing a local existence and uniqueness theorem for the initial value problem. The Maxwell-Lorentz equations on a curved background are of relevance in astrophysics where they can be used to describe the electron component of a plasma; on a flat background, the Maxwell-Lorentz equations can be used, e.g., for modeling a particle beam in an accelerator.

GR 4.3 Di 14:40 KGI-HS 1010

Analytic solution of the geodesic equation in Schwarzschild–(anti) de Sitter space–time — •Eva Hackmann and Claus Lämmerzahl — ZARM - Universität Bremen, Am Fallturm, 28359 Bremen

The complete set of analytic solutions of the geodesic equation in a Schwarzschild-(anti)de Sitter space-time is presented. The solutions are derived from the Jacobi inversion problem restricted to the set of zeros of the theta function, called the theta divisor. In its final form the solutions can be expressed in terms of derivatives of Kleinian sigma functions. The different types of the resulting orbits are characterized in terms of the conserved energy and angular momentum as well as the cosmological constant. Using the analytical solution, the question whether the cosmological constant could be a cause of the Pioneer Anomaly is addressed.

GR 4.4 Di 15:00 KGI-HS 1010

Interferometry in Plebanski–Demianski space–times — •Valeria Kagramanova[1] and Claus Lämmerzahl[2] — [1]Institut für Physik, Universität Oldenburg, 26111 Oldenburg — [2]ZARM, Universität Bremen, Am Fallturm, 28359 Bremen

The Plebanski–Demianski solution is a very general axially symmetric analytical solution of Einsteins field equations generalizing the Kerr solution. This solution depends on seven parameters which include the mass, acceleration and cosmological constant. In this paper we present a general description of matter wave interferometry in this general space–time. We show that it is possible to have access to all parameters separately except a combination of electric and magnetic charge.