GR 18: Grundlegende Probleme

Zeit: Freitag 14:00–15:00 Raum: JUR K

GR 18.1 Fr 14:00 JUR K

On the reduced Next-to-Leading Order Spin-Squared Hamiltonian for Binary Systems — •Steven Hergt — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität, Max-Wien-Platz 1, 07743 Jena, Germany, EU

It is presented the fully reduced (to the physical degrees of freedom) next-to-leading-order Spin-Squared Hamiltonian for arbitrary binaries like black holes or neutron stars modeled by a quadrupole constant, which takes into account self-spin interaction or spin deformation effects at 2nd post-Newtonian order in perturbation theory of Einstein's field equations. The Hamiltonian is calculated in standard canonical variables. Equivalence of different approaches attaining this Hamiltonian (with different spin supplementary condition or coordinates) is also shown.

GR 18.2 Fr 14:20 JUR K

On the equations of motion for a charged dust — •Volker Perlick and Anthony Carr — Physics Department, Lancaster University, Lancaster LA1 4YB, UK

We consider the equations of motion for a charged dust coupled to Maxwell's equations on a general-relativistic spacetime (Maxwell-Lorentz equations). These equations of motion provide a mathematical model, e.g., for the electron component of a (cold) plasma in applications to astrophysics, but also for a beam of charged particles in an accelerator. After establishing some general features of the Maxwell-Lorentz equations, spherically symmetric solutions on Minkowski spacetime are discussed in greater detail. Some unexpected and counter-intuitive properties are found.

GR 18.3 Fr 14:40 JUR K

General Relativity Based on Physical Phenomena — •Albrecht Giese — Taxusweg 15, 22605 Hamburg

Whereas Newton's gravity only covers the static cases, it is the merit of Einstein that he extended gravity to the phenomena occurring at (fast) motion. But Einstein paid an enormous price for his result by changing our understanding of space and time. The resulting theory (GR) is so complex that in the opinion of Steven Weinberg not even 10 physicists may have understood it.

Historically Einstein fell into a trap when he assumed that the speed of light is always constant, even as a 1-way-speed in a moving system. The philosopher Hans Reichenbach, who otherwise supported Einstein, pointed out that this assumption is not compelling, and that Einstein's theory is not the only possible way.

We can, on the other hand, stay with the classical understanding of space, time, and speed addition. We can explain relativity by the behaviour of fields (Heaviside / Lorentz) and of particles (de Broglie / Dirac) and we should accept a variable speed of light in a gravitational field. We then achieve the same results of GR as with Einstein at least up to the Schwarzschild solution. And this way is so easy to follow that it can be taught at school.

In contrast to this, Einstein has with his complex way to relativity impeded the further development of physics for almost a century.

Further info at: www.ag-physics.org/gravity