GR 404: Schwarze Löcher

Zeit: Donnerstag 15:15–16:15 Raum: KIP Kl. HS

GR 404.1 Do 15:15 KIP Kl. HS

Hawking radiation from quasi-normal modes — •Claus Kiefer — Institut für Theoretische Physik, Universität zu Köln, Zülpicher Str. 77, 50937 Köln

A perturbed black hole has characteristic frequencies (quasi-normal modes). Here I apply a quantum measurement analysis of the quasi-normal mode frequency in the limit of high damping. It turns out that a measurement of this mode necessarily adds noise to it. For a Schwarzschild black hole, this corresponds exactly to the Hawking temperature. The situation for other black holes is briefly discussed.

Ref.: C. Kiefer, Class. Quantum Grav. 21 (2004) L123.

GR 404.2 Do 15:30 KIP Kl. HS

Non-uniqueness, Counterrotation, and Negative Horizon Mass of Einstein-Maxwell-Chern-Simons Black Holes — •Jutta Kunz and Francisco Navarro-Lerida — Institut f. Physik, Universität Oldenburg

Stationary black holes in higher dimensional Einstein-Maxwell-Chern-Simons theories possess surprising properties. When considering the Chern-Simons coefficient as a parameter, critical values of this parameter occur. At a first critical value black holes with vanishing horizon angular velocity, but finite angular momentum arise. As the parameter is increased further, counterrotating black holes appear, whose horizon rotates in the opposite sense to the angular momentum. At a second critical value rotating black holes with vanishing angular momentum emerge, and black holes may possess a negative horizon mass, while their total mass is positive. Charged rotating black holes with vanishing gyromagnetic ratio appear, and black holes are no longer uniquely characterized by their global charges.

GR 404.3 Do 15:45 KIP Kl. HS

Static and Rotating Nonuniform Black String Solutions — •Burkhard Kleihaus[1], Jutta Kunz[1], and Eugen Radu[2] — [1]University of Oldenburg, Germany — [2]NUIM, Maynooth, Ireland

Static nonuniform black strings (NBS) arise in higher dimensional spacetimes with one compact extra dimension, when the trivially extended Tangherlini solutions become unstable. We show that the physical properties of the static NBS obtained in five and six spacetime dimensions show qualitative agreement. Our results offer further evidence that the corresponding black hole and the NBS branches merge at a topology changing transition. Rotating NBS are only obtained in six spacetime dimensions for the special case of two equal-magnitude angular momenta. We discuss how branches of rotating NBS arise at the instability point of the trivially extended Myers-Perry solutions and extend either to static NBS or are expected to merge with branches of rotating black holes.

GR 404.4 Do 16:00 KIP Kl. HS

Listening to the interior of a Black Hole? — •Alexander Vikman — LMU-ASC, LS Prof. Mukhanov, Theresienstr. 37, 80333 München, Deutschland

We show that if there exists a special kind of Born-Infeld like scalar field, then one can send information from inside a black hole. This information is encoded in perturbations of the field propagating in non-trivial dynamical scalar field backgrounds, which serves as a "new ether". Although the theory is manifestly Lorentz-invariant, it allows, nevertheless, the superluminal propagation of perturbations with respect to the "new ether". We found a stable solution for background, which describes the stationary spherically symmetric accretion of the scalar field onto a black hole. Examining the propagation of small perturbations around this solution we show that the signals emitted inside the Schwarzschild horizon can reach an observer located outside the black hole. However, there exists an acoustic horizon which separates a region from which information cannot escape. Thus the accreting field forms a hydrodynamical analog of a black hole whose horizon is inside of the gravitational black hole drawing in the scalar field. At the end of the talk the Hawking radiation of phonons (perturbations around this background) and thermodynamics of the system will be discussed.

This talk is based on our work: Escaping from the black hole? E. Babichev (Munich, Max Planck Inst.), Viatcheslav F. Mukhanov, (Munich U.) A. Vikman (Munich U.) JHEP 0609:061,2006. e-Print Archive: hep-th/0604075