

## GR 9: Black Holes 2

Time: Wednesday 14:00–15:45

Location: H-HS IX

GR 9.1 Wed 14:00 H-HS IX

**Gravitational Lensing by an Accelerating Black Hole** — TORBEN FROST and •VOLKER PERLICK — ZARM, University of Bremen, Bremen, Germany

The C-metric is an exact solution of Einstein's vacuum field equations. It generalises the Schwarzschild metric by introducing an acceleration parameter and describes the spacetime of an accelerating black hole. Although it is plagued by unphysical singularities, a conical singularity on the axis of acceleration and another one hidden behind the acceleration horizon, it can be used as a first attempt to describe linearly accelerating black holes. In our work we investigate the effect of the acceleration on classical lensing observables, e.g., redshift, lens map and travel time. We discuss the differences in comparison to the Schwarzschild metric and if and how the effects of the acceleration parameter can be investigated using astrophysical observations.

GR 9.2 Wed 14:15 H-HS IX

**The ISCO of charged particles** — •SASKIA GRUNAU<sup>1</sup> and KRIS SCHROVEN<sup>2</sup> — <sup>1</sup>Institute of Physics, Carl-von-Ossietzky University, Oldenburg, Germany — <sup>2</sup>Astronomical Institute, Czech Academy of Sciences, Prague, Czech Republic

The innermost stable circular orbit (ISCO) is defined by the smallest radius at which a test particle can move on a circular trajectory around a black hole. In accretion disk theory the ISCO is an important property of black holes, since it marks the inner edge of the accretion disk. In the Schwarzschild spacetime the ISCO is located at 6M, while in the Kerr spacetime the ISCO depends on the angular momentum of the black hole as well as on the direction of the angular momentum of the test particle. Here we will study the influence of the charge of a test particle on the ISCO in charged black hole spacetimes.

GR 9.3 Wed 14:30 H-HS IX

**Overcharging and discharging processes in black hole physics** — •EMANUELE DI MAIO<sup>1,2</sup>, PIERO NICOLINI<sup>2</sup>, and MARIAFELICIA DE LAURENTIS<sup>1</sup> — <sup>1</sup>Università degli studi di Napoli federico II, Napoli, Italia — <sup>2</sup>Goethe-Universität, Frankfurt Am Main, Germany

Upon specific conditions for charge and mass parameters, it has been conjectured that black holes might overcharge in contrast to the tenets of the cosmic censorship. The net result of overcharging is the destruction of the event horizon and the formation of a naked singularity. In this talk we will scrutinize the overcharging against quantum processes, such as the Schwinger effect and the Hawking radiation.

GR 9.4 Wed 14:45 H-HS IX

**Barriola Vilenkin gravitational monopole: an exact solution.** — •PIERO NICOLINI<sup>1</sup>, MARCO KNIPFER<sup>2</sup>, SVEN KÖPPEL<sup>1</sup>, and JONAS MUREIKA<sup>3</sup> — <sup>1</sup>Goethe Universität, Frankfurt — <sup>2</sup>University of Alabama, Tuscaloosa — <sup>3</sup>Loyola Marymount University, Los Angeles

After briefly recalling the properties of the Barriola-Vilenkin metric, we will present a new exact monopole solution in five dimensional non-local gravity. This object turns out to be the end point of the black hole evaporation. Interestingly for smaller masses, the spacetime admits a “naked monopole” rather than a generic naked singularity. The solution is discussed against current proposals for dark matter component candidates.

GR 9.5 Wed 15:00 H-HS IX

**Rotating and excited black holes in Einstein-scalar-Gauss-Bonnet theory** — LUCAS COLLODEL<sup>1</sup>, BURKHARD KLEIHAUS<sup>2</sup>, •JUTTA KUNZ<sup>2</sup>, and EMANUELE BERTI<sup>3</sup> — <sup>1</sup>University of Tübingen — <sup>2</sup>University of Oldenburg — <sup>3</sup>Johns Hopkins University

We present rotating fundamental and radially excited black holes in Einstein-scalar-Gauss-Bonnet theory with a quadratic coupling function. We determine their domains of existence and show that there are also angularly excited rotating black holes. We determine the bifurcation points of the radially and angularly excited solutions from the Schwarzschild black hole and show that these follow a regular pattern.

GR 9.6 Wed 15:15 H-HS IX

**Quasinormal modes of black holes with scalar hair** — •JOSE LUIS BLÁZQUEZ-SALCEDO — Carl von Ossietzky University of Oldenburg, Oldenburg, Germany

We study quasinormal modes of black holes in several alternative theories of gravity. In particular, we focus on theories that include an additional scalar field coupled non-trivially with gravity. Several models exist that allow to obtain black holes with non-trivial scalar hair. In this talk we will discuss some results concerning linear perturbations of these configurations, their ringdown spectrum and their stability.

GR 9.7 Wed 15:30 H-HS IX

**Quasinormal modes of dilatonic Reissner-Nordström black holes** — JOSE LUIS BLÁZQUEZ-SALCEDO, •SARAH KAHLEN, and JUTTA KUNZ — Carl von Ossietzky Universität, Oldenburg, Germany

Some numerically obtained quasinormal modes of static spherically symmetric dilatonic Reissner-Nordström black holes for general values of the electric charge and of the dilaton coupling constant are presented. The spectrum of quasinormal modes is composed of five families of modes: polar and axial gravitational-led modes, polar and axial electromagnetic-led modes, and polar scalar-led modes. A quantitative analysis of the spectrum reveals its dependence on the electric charge and on the dilaton coupling constant. For large electric charge and large dilaton coupling, strong deviations from the Reissner-Nordström modes arise. In particular, isospectrality is strongly broken for large values of the charge, both for the electromagnetic-led and the gravitational-led modes.