

GR 6: BH Physics I

Time: Wednesday 11:00–12:25

Location: ZHG008

Invited Talk GR 6.1 Wed 11:00 ZHG008
Black hole dynamics from a mathematical perspective —
 ●DEJAN GAJIC — Institut für Theoretische Physik, Universität
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I will present an overview of recent mathematical results on the dynamics of spacetimes arising from initial data perturbations of Kerr black holes, both from linear and nonlinear point of view. An important role is played by extremal black holes, which exhibit novel dynamical features, such as instabilities and criticality.

GR 6.2 Wed 11:45 ZHG008
Unmasking Black Hole Mimickers in Higher-Curvature Gravity —
 ●MICHAEL FLORIAN WONDRAK — Department of Astrophysics/IMAPP,
 Radboud Universiteit, Nijmegen, The Netherlands — Department of
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In higher-curvature gravity, Birkhoff's theorem no longer applies, i.e. the Schwarzschild black hole is no longer unique, but widens to a family of black hole mimickers, namely naked singularities and wormholes. Some naked singularities seem undistinguishable from Schwarzschild when the accreted matter is treated as pressureless in a simple analytical way. Closer to reality, however, with (beyond-GR)MHD simulations, those naked singularities can be ruled out by BH imaging as they dynamically form a hot and bright mass accumulation around the would-be horizon. So not only impacts the accuracy in modeling accreted matter the potential of ruling out BH mimickers, it also allows to constrain a variety of quantum-gravity theories based on their

low-energy predictions.

GR 6.3 Wed 12:05 ZHG008
Wave optical imaging by a point-source scattering for a TNdS black hole — ●FELIX WILLENBORG^{1,2}, DENNIS PHILIPP^{1,2}, and
 CLAUS LÄMMERZAHN^{1,2} — ¹Zentrum für angewandte Raumfahrt und
 Mikrogravitation (ZARM), University of Bremen, 28359 Bremen, Germany —
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The Taub-NUT spacetime is a curious solution of the Einstein's vacuum field equation due to the presence of conical singularities and their different interpretations for NUT charges $N \neq 0$. Gravitational lensing maps have shown the twisting of a background for light- and time-like geodesics, as well as the observation of the conical singularity in the Bonnor interpretation.

Several methods offer a theoretical description of these observations. Already mentioned are ray-optical methods by geodesics or the calculation of the scattering by the so-called amplification factor F by the description of time-delays t_d . In our work, we describe the calculation by a full wave equation using the Teukolsky equation, which allows access to all frequencies. To obtain fully analytical solutions, a small cosmological constant is considered, generalising the solution to Taub-NUT-de Sitter (TNdS). We observe the scattering of a monochromatic point source to an observer at a larger distance from the black hole. Afterwards, we briefly discuss the method and present results for Schwarzschild-de Sitter at very low frequencies in a wave-optical approach as a simple model. Finally, we present results for TNdS and how these change with the parameter variation.