Contributed Talk

Name: Filip Hejda **Position:** Post-Doc/Research Fellow

Affiliation: CEICO, Institute of Physics of the Czech Academy of Sciences

Title: Charged particle collisions and energy extraction from extremal electrovacuum black holes

Abstract: In the last decades, a lot of attention has been devoted to test particle collisions with arbitrarily high energy in the vicinity of extremal black holes, which constitute an idealised best-case scenario for the collisional Penrose process. One studied possibility requires fine-tuned particles corotating with an extremally spinning black hole, whereas another variant of such process relies on particles with fine-tuned charge moving near an extremally charged black hole. Even in this simplified setup, the energy that can be extracted turned out to be capped by unconditional upper bounds, yet only in the more interesting maximally rotating case, but not in the more hypothetical maximally charged one. We have recently studied a more general process for charged particles orbiting an extremal electrovacuum black hole, which unifies the two mentioned cases [Phys. Rev. D 95, 084055 (2017)]. Following up on those results, our present work examines energy extraction through this general process. We show that the unconditional upper bounds on the extracted energy are absent whenever both the black hole and the escaping particle have a non-zero charge. We also discuss that the process in the equatorial plane does not suffer from additional limitations that we found for the simpler case of charged particles moving along the axis of symmetry [Phys. Rev. D 100, 064041 (2019)].