Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Particle motion and acceleration in accretion flows FABIO BACCHINI, GU Frankfurt am Main, BART RIPPERDA, Center for Computational Astrophysics, Flatiron Institute, OLIVER PORTH, University of Amsterdam, LORENZO SIRONI, Columbia University NYC, ALEXANDER PHILIPPOV, Center for Computational Astrophysics, Flatiron Institute — The recent reveal of the first direct black hole observations by the Event Horizon Telescope (EHT) collaboration has opened a new window on the physics of relativistic plasmas. For the first time, it is possible to verify theoretical predictions for plasma phenomena in accretion disks and jets in the surroundings of compact objects. In such environments, particles are accelerated to extremely high energies. Current ideal magnetohydrodynamic (MHD) models can reproduce the global structure of accretion flows and the related thermal physics of plasmas. However, no information on the mechanisms behind the acceleration of particles to nonthermal energies is included in such models. This lack of information on the microphysics represents the largest uncertainty in theoretical EHT results. The problem can be overcome by employing microphysical models based on particles. The physics of particle acceleration can be studied in MHD simulations with test particle approaches. The energy flows to and from single particles can be analysed in order to obtain realistic radiation models. These studies have important consequences for the interpretation of current and future observations of black hole environments.

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Date submitted: 02 Jul 2019 Electronic form version 1.4