

Abstract Submitted  
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**Compton scattering collision module for OSIRIS<sup>1</sup>** FABRIZIO DEL GAUDIO, THOMAS GRISMAYER, Instituto Superior Tcnico, RICARDO FONSECA, Instituto Universitrio de Lisboa, LUS SILVA, Instituto Superior Tcnico — Compton scattering plays a fundamental role in a variety of different astrophysical environments, such as at the gaps of pulsars and the stagnation surface of black holes. In these scenarios, Compton scattering is coupled with self-consistent mechanisms such as pair cascades. We present the implementation of a novel module, embedded in the self-consistent framework of the PIC code OSIRIS 4.0, capable of simulating Compton scattering from first principles and that is fully integrated with the self-consistent plasma dynamics. The algorithm accounts for the stochastic nature of Compton scattering reproducing without approximations the exchange of energy between photons and unbound charged species. We present benchmarks of the code against the analytical results of Blumenthal et al. and the numerical solution of the linear Kompaneets equation and good agreement is found between the simulations and the theoretical models.

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