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**A collision module for OSIRIS** MICHAEL MARTI, RICARDO FONSECA, LUIS SILVA, GoLP/CFP, Instituto Superior Técnico, Portugal, JOHN TONGE, WARREN MORI, UCLA — Standard PIC “collisions” occur between finite sized particles. It is an inherent property of the PIC algorithm that collisional effects therefore are not properly reproduced in a standard implementation. Present day problems in plasma physics on the other hand require full scale modeling and collisions can no longer be neglected (for instance in fast ignition scenarios). In order to deal with collisional effects, we have implemented a binary collision module in osiris 2.0. The implemented algorithm is fully relativistic, and different weights for different particles are allowed without violating the conservation of energy and momentum. The plasma to be simulated can have properties with a strong spatial dependence - relevant quantities for the collisions (density, temperature, collision frequency) can be calculated locally. The collision module is benchmarked against the theoretical thermalization rates and the distribution function properties in equilibration for non-relativistic and relativistic conditions. The influence of the numerics (particle weights, time step, particles / collision cell) is also explored in detail.

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