# SPACECHARGE MODELS IN THE GENERAL PARTICLE TRACER (GPT) CODE

M.J. de Loos, O.J. Luiten, TUE, Eindhoven;
M.J. de Loos, S.B. van der Geer, Pulsar Physics, Eindhoven

*Abstract*

The General Particle Tracer (GPT) code is a well established package for the design of charged particle accelerators and beam lines. A crucial component of this code is the calculation of Coulomb interactions. In this contribution we present two different numerical algorithms for the calculation of these particle-particle effects: The standard Particle-In-Cell (PIC) method and a Barnes-Hut (B&) treecode approach. The PIC method is fast and reliable, but it does not include binary interactions. The method is therefore inapplicable when disorder induced heating plays a role, for example in electron microscopes and focused ion beams. The Barnes-Hut method, borrowed from the astrophysics community, calculates all pair wise interactions in an efficient manner. This approach covers all Coulomb effects, but it is potentially much slower. A realistic test case is presented highlighting the strengths and weaknesses of both approaches.

**CONTRIBUTION NOT RECEIVED**