**Milestone 48: Heavy-ion penetration in GEANT4**

The computer code ATIMA has been developed at JLU Gießen and GSI Helmholtzzentrum für Schwerionenforschung specifically for the calculation of the energy-loss of relativistic heavy ions in matter. In the existing version ATIMA 1.3, the stopping power above 30 MeV/u is based on the theory of Lindhard and Sorensen [Phys. Rev. A53, pg.2443, 1996] for shell corrections, a Barkus term and the Fermi-density effect. Recent development of ATIMA includes (i) an improvement of the calculation of projectile charge down to 30 MeV/u. The resulting stopping power has been benchmarked against experiments performed at GSI; (ii) an extension to beam atomic numbers up to 120 and target atomic numbers up to 99. These activities have already taken place in the first two years of SATNuRSE.

The goal of Subtask 1.3 of SATNuRSE is the inclusion of modern atomic-interactions routines in GEANT4. For Milestone 48, preparations for the implementation of the ATIMA code into GEANT4 have begun at GSI in collaboration with the University of Saintiago de Compostela. Once the code is implemented, it should be available for SATNuRSE members for validation and benchmarking and further available to the community. A beta-version is planned for June 2018.