

Applications of steering and radiation effects in modern physics and their simulation using Geant4.

Electromagnetic processes of charged particles interaction with oriented crystals provide a wide variety of innovative applications such as beam steering, crystal-based extraction/collimation of leptons and hadrons in an accelerator, a fixed-target experiment on magnetic and electric dipole moment measurement, X-ray and gamma radiation source for radiotherapy and nuclear physics and a positron source for lepton and muon colliders as well as plasma acceleration in the crystal media. One of the main challenges is to develop an up-to-date, universal and fast simulation tool to simulate these applications.

In this seminar, the implementation of a new simulation model of electromagnetic processes in oriented crystals into Geant4 [1] is presented. The model is validated with the experimental data. Its advantages and perspectives for the applications of oriented crystals mentioned above are also discussed.

[1] J.Allison et al., NIM A 835, 186-225 (2016).

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