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New Geant4 simulation model of X- and gamma-rays production by electron and positron beam in oriented crystals

X- and gamma-rays production in oriented crystals is a very promising radiation source for various innovative applications, in particular, a positron source for future lepton colliders, a radiation source for radiotherapy and nuclear physics as well as is an essential process in an ultracompact electromagnetic calorimeter for high-energy experiments. A suitable simulation tool, capable to simulate both radiation physics and an entire experimental setup is one of the main challenges towards the development of these applications.

We present a new simulation model implemented into the Geant4 simulation toolkit [1] which potentially overcomes this challenge. It allows one to simulate the generation of X-ray and gamma-rays by ultrarelativistic electrons and positrons moving at a small angles w.r.t. crystallographic axes or planes and uses at the same time a rich Geant4 library of physics to simulate an entire setup.

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

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Abstract Fields

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Paper Submission Plan (for reference only)

Yes

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