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G4ChannelingFastSimModel and G4BaierKatkov model for the FCC-ee crystal-based positron source

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Simulation of a crystal-based positron source requires sophisticated modeling of the trajectories of electrons and positrons in a heavy crystalline material, such as a tungsten crystal. This also includes accounting for their multi-photon radiation and ionization energy losses. The models [1-3] for charged particle motion in an averaged atomic potential, as well as their radiation using the Baier-Katkov method [4], have been implemented into the Geant4 simulation toolkit [5] within the G4ChannelingFastSimModel [6] and G4BaierKatkov models, respectively. These models have been released in Geant4 version 11.2. Our recent updates will be included in the next Geant4 release later this year.

We provide a detailed description of the model, its performance, and its functionality, and we compare our simulation results with experimental data [7].

- [1] A. I. Sytov, V. V. Tikhomirov, and L. Bandiera, *Phys. Rev. Acc. And Beams* 22, 064601 (2019).
- [2] V. Guidi, L. Bandiera, V. Tikhomirov *Phys. Rev. A* 86, 042903 (2012).
- [3] Bandiera et al., *Nucl. Instr. Methods Phys. Res. B* 355, 44 (2015).
- [4] V.N. Baier, V.M. Katkov, V.M. Strakhovenko, *Electromagnetic Processes at High Energies in Oriented Single Crystals* (World Scientific, Singapore, 1998).
- [5] J. Allison et al., *NIM A* 835, 186-225 (2016).
- [6] A. Sytov et al., *JKPS* 83, 132-139 (2023).
- [7] L. Bandiera et al. *Eur. Phys. J. C* 82, 699 (2022).

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