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Recent Progress of Geant4 Electromagnetic Physics and Readiness for the LHC Start

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The status of Geant4 electromagnetic (EM) physics models is presented, focusing on the models most relevant for collider HEP experiments, at LHC in particular. Recently improvements were undertaken in models for the transport of electrons and positrons, and for hadrons. Models revised included those for single and multiple scattering, ionization at low and high energies, bremsstrahlung, annihilation, scintillation and Cerenkov. Validation has been performed against experimental data. Typical results of comparisons are shown.

There was a significant update of the bremsstrahlung models. This introduced a new description of the relativistic regime for electrons and positrons, which describes precisely the recent LPM experiment at CERN. New models for bremsstrahlung and electron-positron pair production by hadrons were introduced. A significant effect is observed due to the bremsstrahlung of pions is observed, affecting the signal in EM calorimeters of LHC detectors.

With a focus on the LHC start-up, we discuss performance versus precision of different configurations of EM physics.

Primary author: Prof. IVANTCHENKO, Vladimir (CERN, ESA)

Co-author: Dr MAIRE, Michel (LAPP)

Presenter: Prof. IVANTCHENKO, Vladimir (CERN, ESA)

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