Project title: Development and validation of models for high-energy positron interactions with media

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Project description:

Geant4 models for production of muon, pion, kaon pairs by high-energy positrons will be studied. These rare processes may provide background for exotic search with the new high luminosity run data of LHC and for interaction point background in future linear colliders. The work program includes validation of Geant4 cross-sections versus theory, study and improvement of software implementation of these models, and building a validation application. On a second stage of the project, the effects of these processes to CMS data analysis will be performed, targeting the estimation of possible background to channels that are used for search of new physics at LHC.

As result of the project, the testing suite for the Geant4 electromagnetic physics processes will be extended, and recommendations to LHC and ILC simulations will be given. The student will work within the PH/SFT group in close contact with the CMS simulation team.

Student profile: Physics
Project content: Physics and computing
Training value: The student will have the opportunity to study the Geant4 simulation toolkit, become familiar with methods to create Geant4 standalone applications, and learn how Geant4 is used inside an LHC experiment framework.
Computing skills: basic knowledge is required for particle interaction with matter, also Unix, C++, Geant4, ROOT. Any knowledge of CMSSW will be beneficial.