NEBULA with Geant4

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Dear Reviewer,

My name is Balázs Pál and I'm working on a project on the course called "Scientific Modelling Computer Lab" at ELTE where my main goal is to implement the NEBULA neutron detector array using the Geant4 simulation toolkit and analyse it response to neutron beams.

The Geant4 software is developed for decades by now by the Geant4 Collaboration at CERN and its goal to serve as an engine/backend for particle- and nuclear physics simulations. The immense number of tools it offers and the way as any user intends to use it, makes it a real software developing job to create a simulation with Geant4.

Despite every obstacle, I've managed to implement the simplified version of the Japanese NEBULA plastic scintillator array using Geant4 and conducted numerous tests with it. I've studied, how the detector responses to neutron bombardment in the 100 MeV and 300 MeV energy range. Events are also visualized in real time with an OpenGL+Qt engine.

Further improvements are still needed however. My goal for the second part of the semester is to create an analysis pipeline, which makes the number of events, the energy deposit of neutrons and other important variables able to be investigated.

For Geant4 source codes and other relevant scripts, along with documentations refer to my GitHub repository ELTE_Modelling_lab_2021. The project source codes and the various install and run scripts are also included on Moodle.

Sincerely,

Balázs Pál