NEBULA with Geant4

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Dear Reviewer,

My name is Balázs Pál and I have worked on a project in nuclear physics during the second semester of 2020-2021 semester on the course called "Scientific Modelling Computer Lab" at ELTE. During the project my main goal was to implement the Japanese NEBULA neutron detector array using the Geant4 simulation toolkit and analyse its response to neutron beams.

It was a heavily technical project, because Geant4 should be used as software engine, where the user develops his or her own simulation software on it. The countless tools and options it offers can be quite overwhelming for any new users. Overcoming all obstacles in this matter was quite challenging sometimes, but I successfully got over them. As a result I was able to implement a section of the NEBULA detector array in Geant4 and make it ready to produce different kinds of simulation data at ease.

During the project I've discussed questions about the energy deposit of neutrons in the detector rods, the types of particles and physical processes taking place during different simulations and finally I've explored the detection accuracy of the NEBULA detector on its full operation range.

For the 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