

Bendegúz Borkovits
Budapest
Hungary
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Reviewer
Eötvös Loránd University (ELTE)
Pázmány Péter sétány 1/A.
Budapest
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Dear Reviewer,

my name is Bendegúz Borkovits and I am writing to you about a project called Simulating detectors with Geant4 that I have been working on while attending the course Scientific Modelling Computer Laboratory at ELTE.

The main goal of the project is to use Geant4 to simulate a neutron detector. Geant4 is a software developed at CERN that allows the creation of virtual detectors, thus the opportunity to simulate real-life detectors at home and model particle induced events. The software offers an enormous number of built-in libraries that provide the user with tools to define the desired parametrization of the detector, the particles, and the environment itself.

During the first half of the semester, my work consisted of learning how to build a simulation using said software by following tutorials to inquire about the stepping stones of a Geant4 program and solve the technical difficulties that arose during the early development of the project. As a result, I simulated Cherenkov radiation that was induced by a proton. Then, I extracted data about the properties of the optical photons via a set of photo-sensitive detectors. Finally, using Python in a Jupyter notebook, I successfully prepared the data for evaluation. As for the progress I have made in the second half of the semester, I received a simulation on the NEBULA detector of the SAMURAI Beam line from one of my consultants to work with. I simulated the projection of a neutron beam onto the detector by enabling different built in physics lists. Then, I grouped the particles generated by the collision of the beam and the detector. I also showcased the energy deposited by said particles into the various volumes of the detector. Finally, I made some analysis regarding the protons generated by the process.

In conclusion, I have inquired enough information about the software to be able to create my own simulation. Then, I managed to evaluate the data yielded by the NEBULA simulation in the previously described ways. All the source files, reports, presentations, and notebooks have been uploaded to Moodle and will also be updated to my GitHub repository.

Yours faithfully,

Bendegúz Borkovits