Simulating detectors with Geant4 3rd presentation

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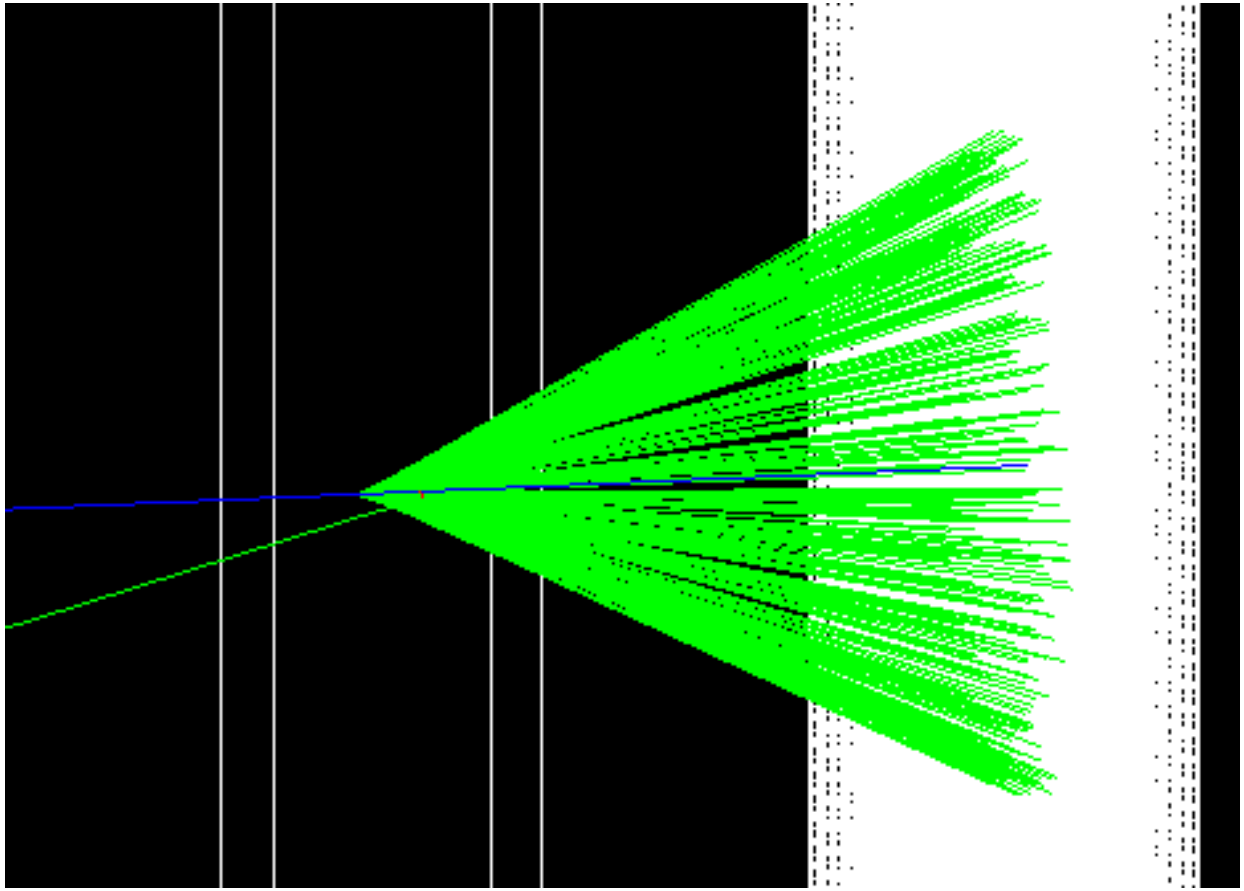
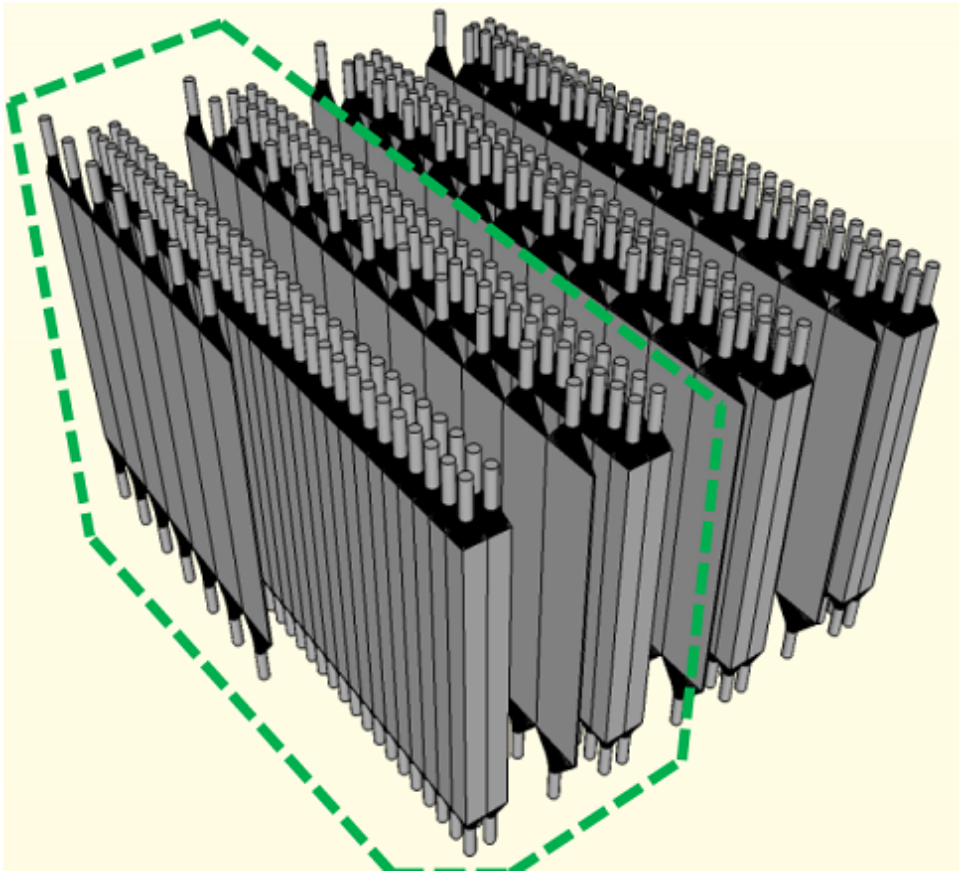
Previously...



- Cherenkov detector simulation.
- Showcasing the output.
- Saving data and analysis in Python.

NEBULA detector

- Scintillator array with large volume.
- Fast neutron events in range 100-300 MeV.
- Part of SAMURAI beam line at RIKEN RI Beam Factory.
- 120 NEUT and 48 VETO detector modules (2-layer walls).
- Modules contain a plastic scintillator and 2 PMTs.



NEBULA detector

Smsimulator

- NEBULA simulator.
- C++ program based on Geant4.
- ROOT libraries for visualisation.
- Updated frequently.
- Offers the following:
  - simulating response to a single neutron,
  - simulating trajectory of charged fragment in the SAMURAI magnet,
  - simulation for N-body neutron decay.
- Very difficult to install.

Solution and further plans

- Solution:
  - Simulation made by Balázs Pál.
  - Modifications.
  - Programming error: consultation is still underway.
- Plans for the next weeks:
  - Neutron with energy of 100 MeV.
  - Output showcase.
  - Statistical analysis.

References

- Geant4 documentation: `https://geant4.web.cern.ch/`
- NEBULA detector official site: `http://be.nucl.ap.titech.ac.jp/~nebula/index.php`
- Smsimulator official site: `http://be.nucl.ap.titech.ac.jp/~nebula/simulator.php`
- RI Beam factory informations: `https://www.riken.jp/en/collab/resources/ribf/`
- Balázs Pál simulation: `https://github.com/masterdesky/ELTE_Modelling_Lab_2021/tree/main/project/project_nebula/NEBULA`