

Meiga, a dedicated framework used for muography applications #26

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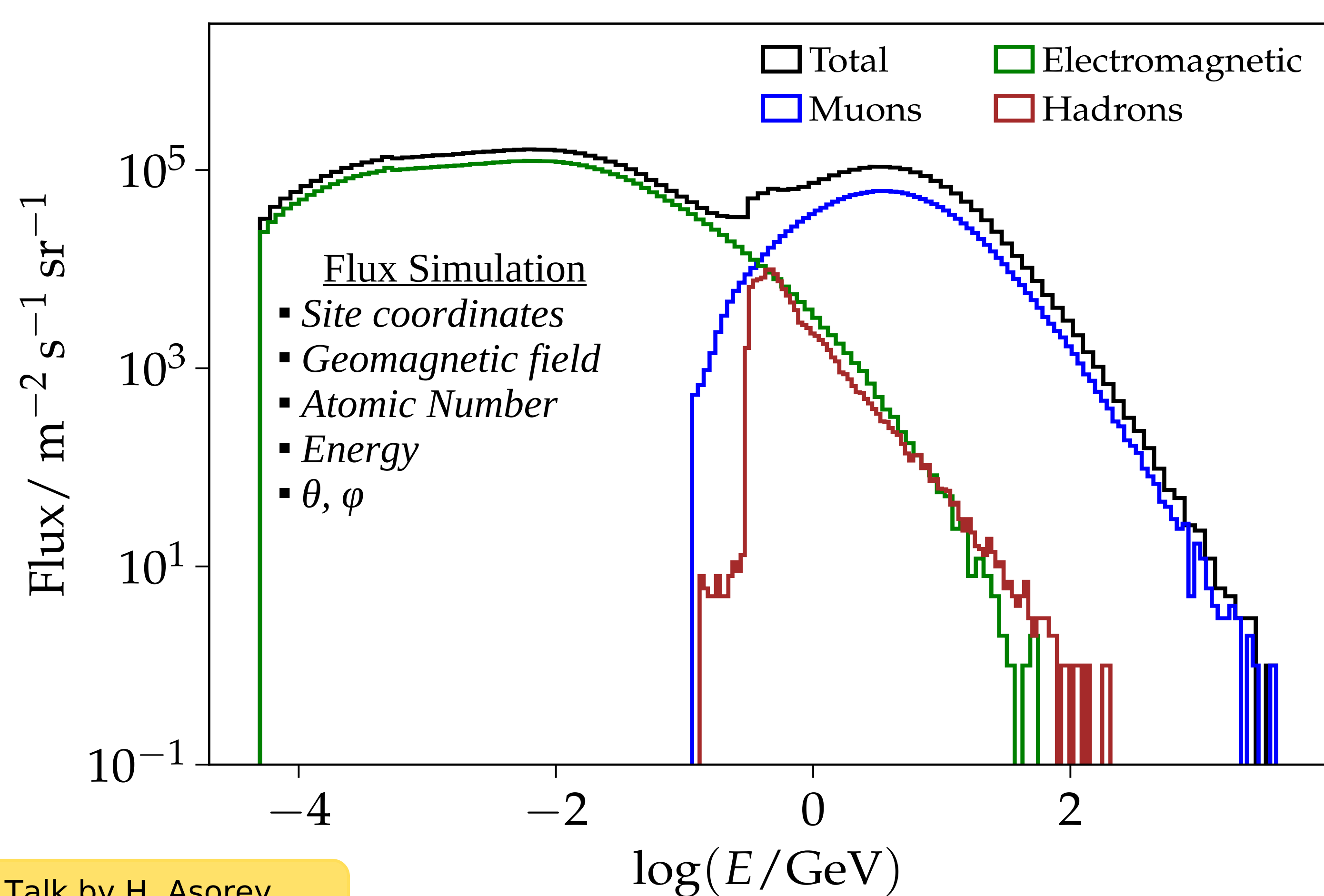
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Meiga is a framework conceived for simulation and reconstruction of muography applications. This framework takes a simulated muon flux at ground level and propagates it through a given material where the detectors are located. It uses Geant4 [1] as a toolkit for the simulation of traversing particles through the material and computes the signal produced when muons pass through any type of detector at the desired location. Both, simulated and reconstructed data are stored for an offline analysis. In this poster, an overview of *Meiga* is presented. Starting by the calculation of the muon flux (1.), propagation and detector simulation (2.), integration and framework usage (3.), ending with the conclusions and future prospects (4.).

1. A simulated cosmic muon flux is passed as *input*

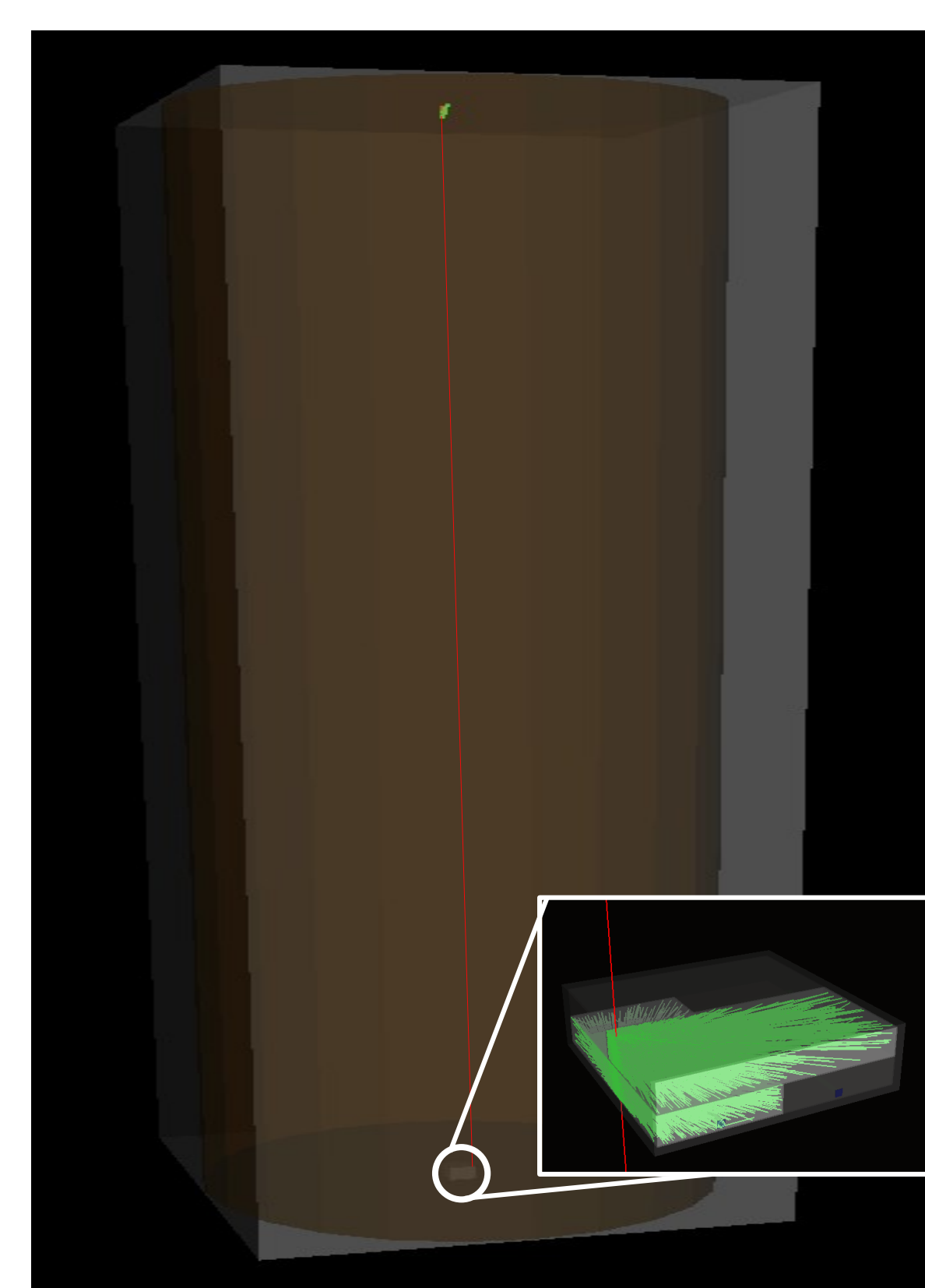
This realistic flux is simulated considering the geomagnetic field, wide energy ranges and arrival directions [2, 3].



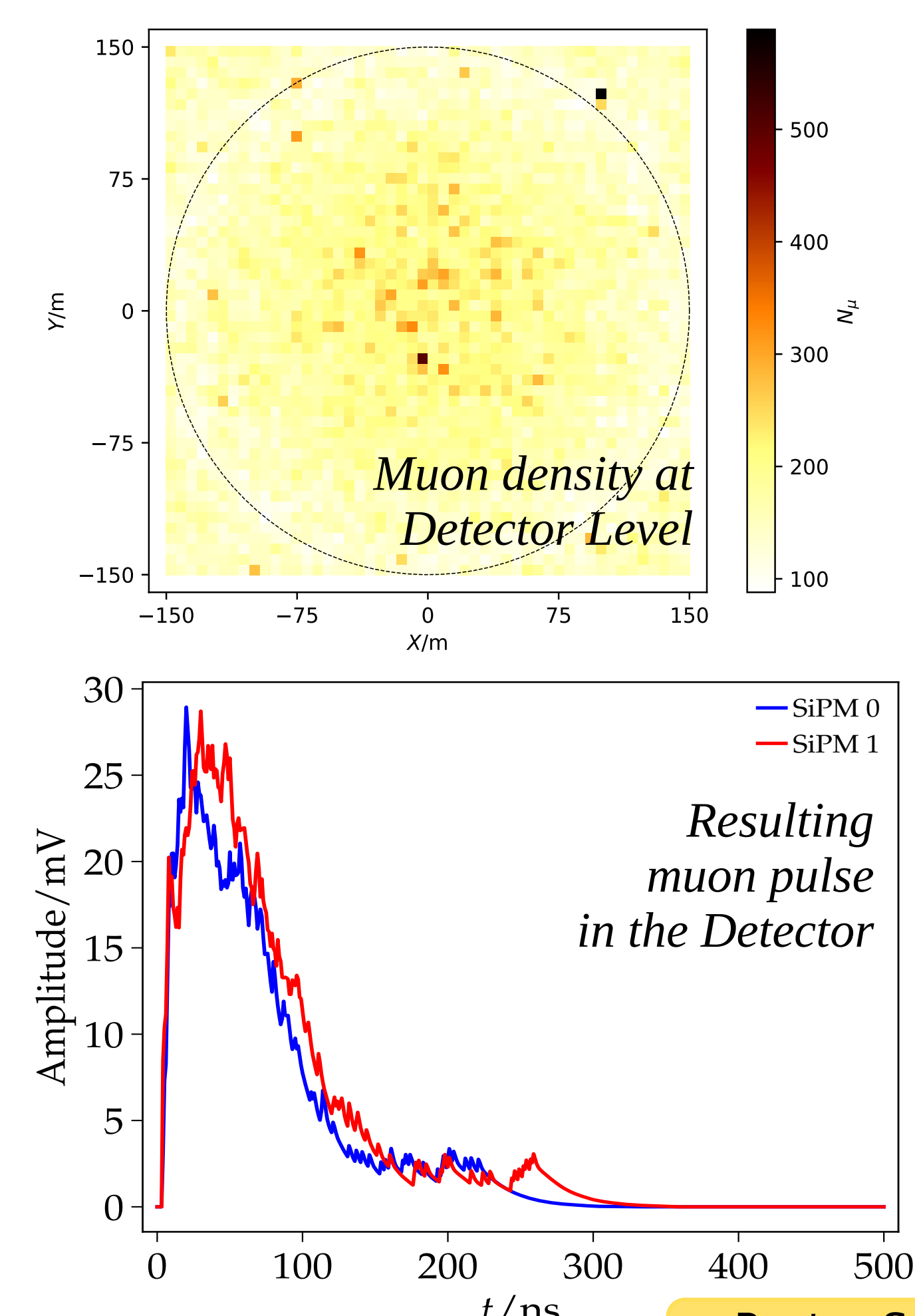
Talk by H. Asorey on Tuesday

2. Muon propagation and detector interactions are performed with *Geant4*

Providing customizable detector models and easy access to detector signals.



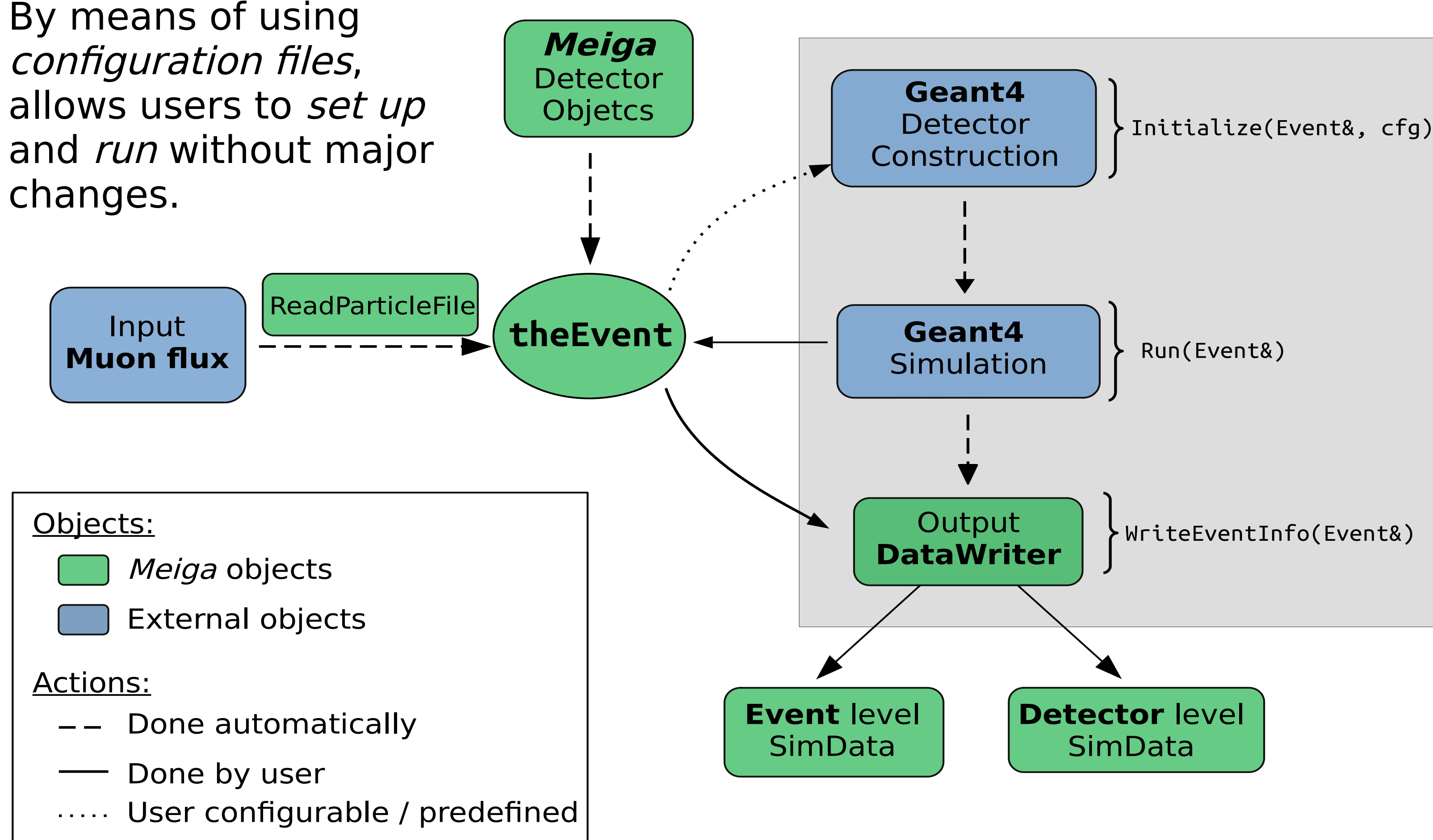
Simulation of traversing muons through material and Scintillator Detector with Optic Fibers and SiPMs



Poster Session #40

3. Integration of flux and detector simulation in versatile applications

By means of using *configuration files*, allows users to *set up* and *run* without major changes.



Applications are run with **configuration files**

`./meigaAppExe -c Config.json`

The main program is executed in three methods:

1. Initialize()

- Creates *Event* object.
- Simulation is set up from *configuration file*.

2. Run()

- Runs Geant4 simulation.
- Passes simulated data into *Event*.

3. WriteEventInfo()

- Called when simulation ends.
- Writes output into ASCII files.

4. Summary and Outlook

The *Meiga* framework uses realistic muon flux and comprehensive Geant4 simulations providing customizable detector models integrated in different applications.

Its easy structure and the usage of **configuration files**, allow users without high skills in *Geant4* to set up and run their own applications.

Following steps:

- Include muon imaging reconstruction algorithms.
- Open Source release for the community.

References

- [1] Geant4 - a simulation toolkit, S. Agostinelli *et al.*, 2003.
- [2] CORSIKA: A Monte Carlo Code to Simulate Extensive Air Showers, D. Heck *et al.*, 1998.
- [3] C. Sarmiento-Cano *et al.*, PoS(ICRC2019)412.