FLAG

FLUKA-ACTS-Geant4

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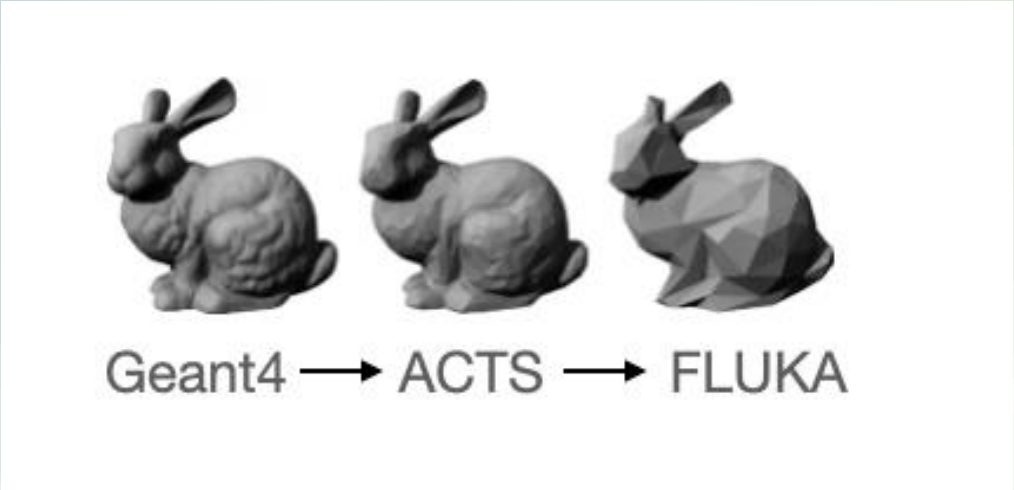
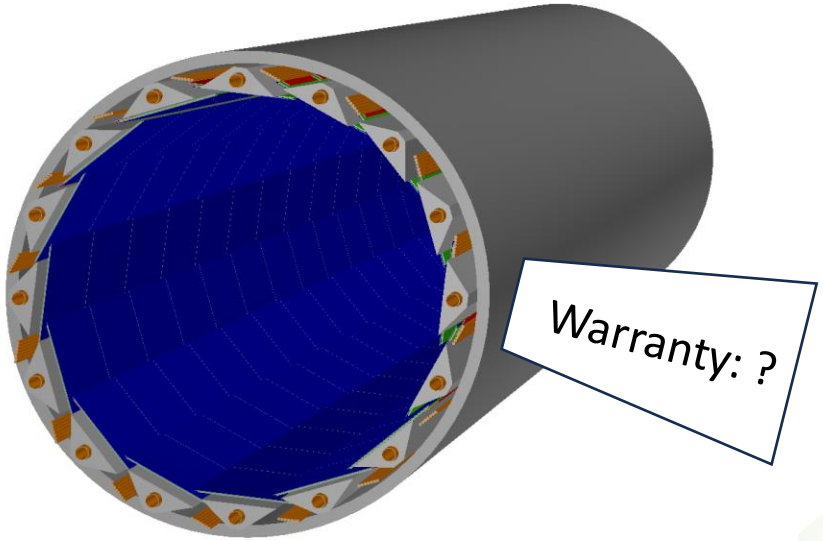


Motivation

- **Different kinds of simulators**, such as particle and radiation simulators, **are used in high energy physics** for different purposes.
- **Particle detectors (real) wear out** because of the **radiation** that is created when the detectors are used at high efficiency for a long time.
- The **efficiency goes down** and the detectors have to be replaced.
- With **radiation estimates** it is possible to estimate for **how long the detectors can be used**.



Task

pyg4ometry

Geant4: Detector simulation for physics

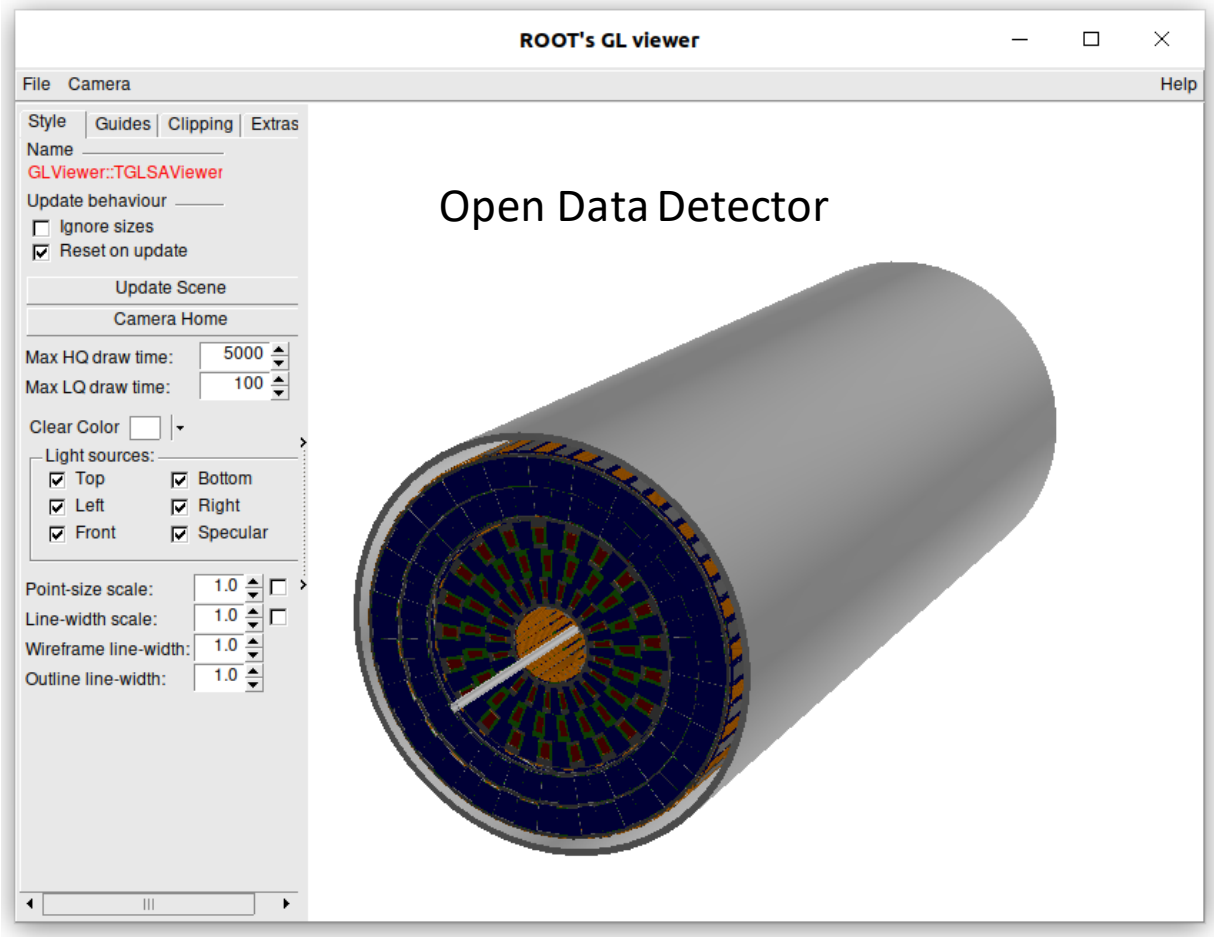
ACTS: Tracking software toolkit

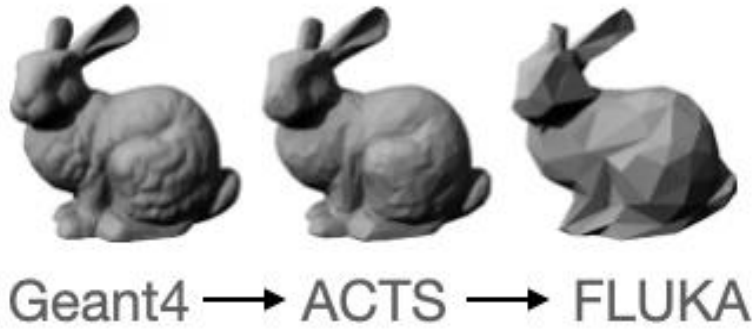
FLUKA: Used for radiation studies

They use different input/output formats

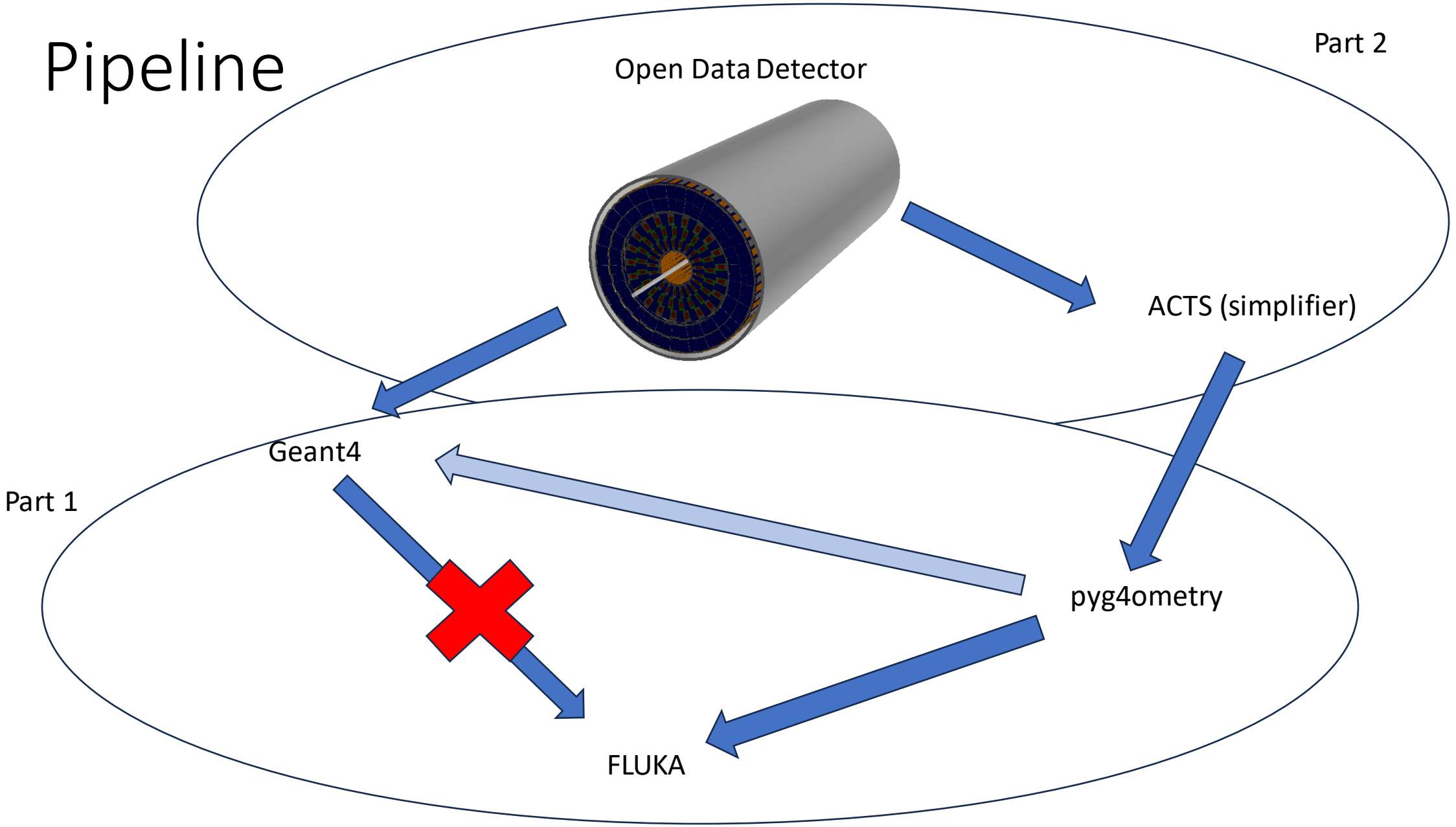
Complications

- All programs come with different file formats
- The original detector structure is too complex for the software to handle.
- The geometry needs to be simplified.



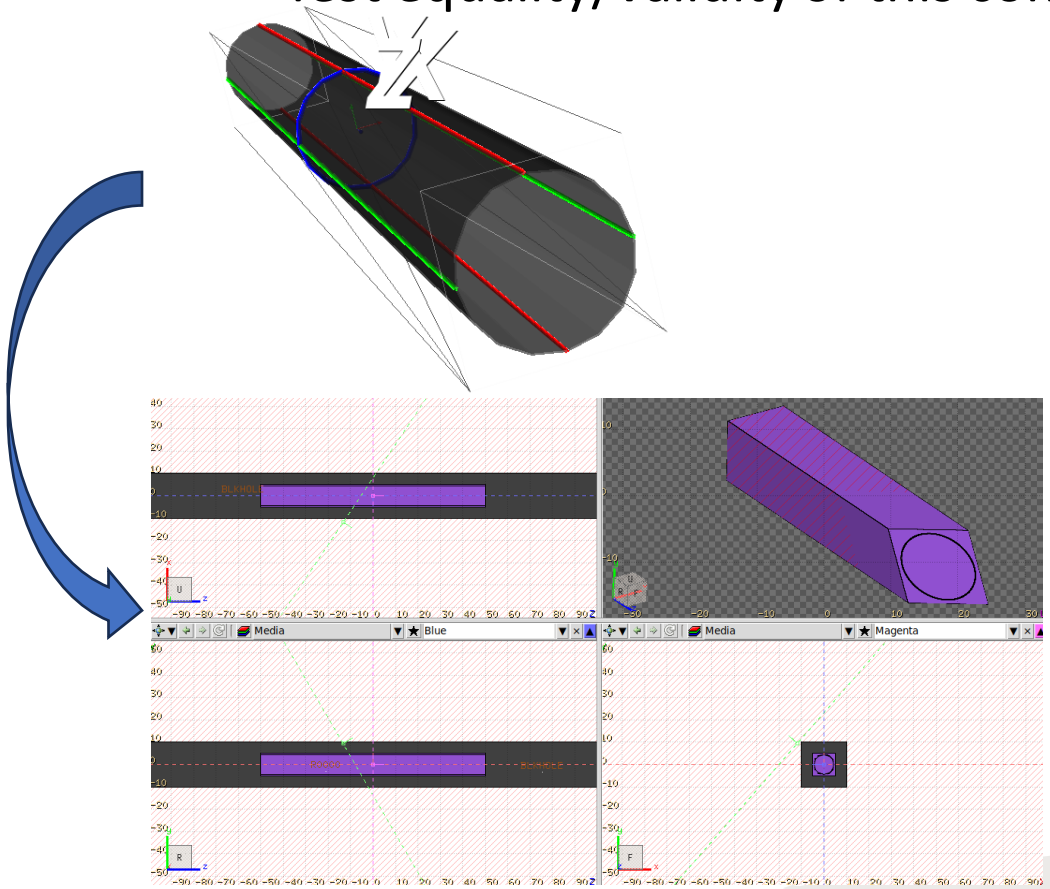


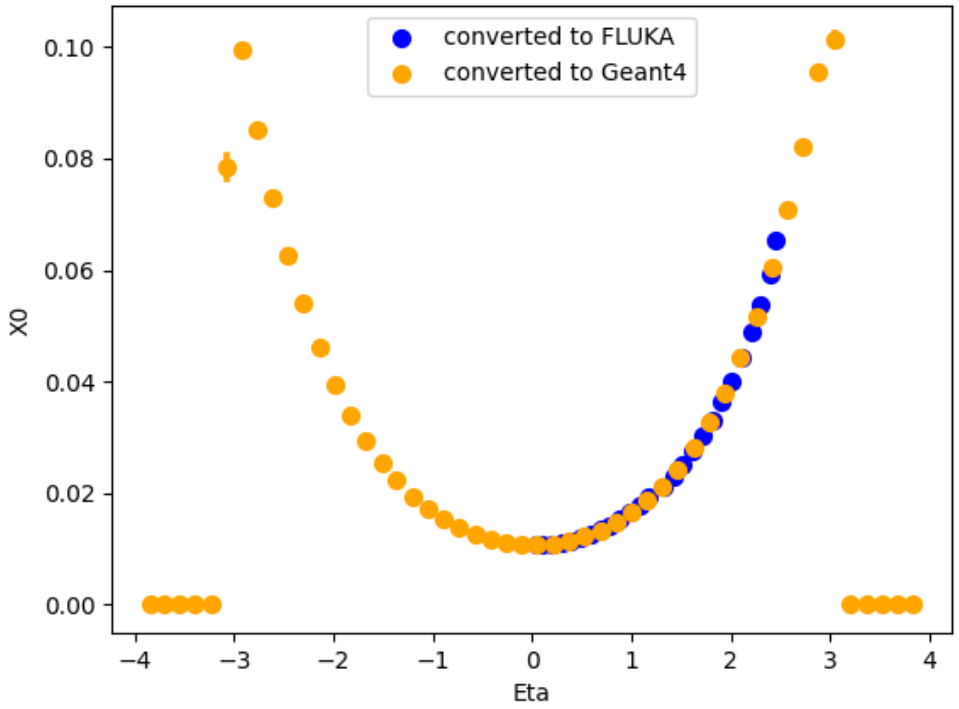
Pipeline


Part 2
Open Data Detector
ACTS (simplifier)
Geant4
Part 1
pyg4ometry
FLUKA

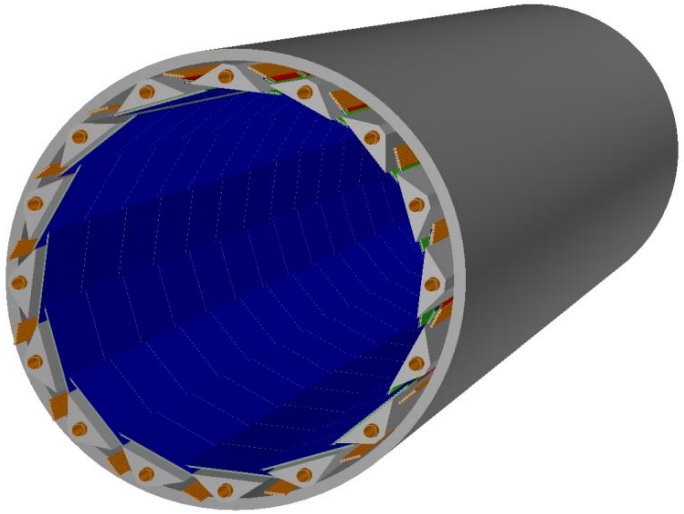
Part 1 – Geometry Conversion

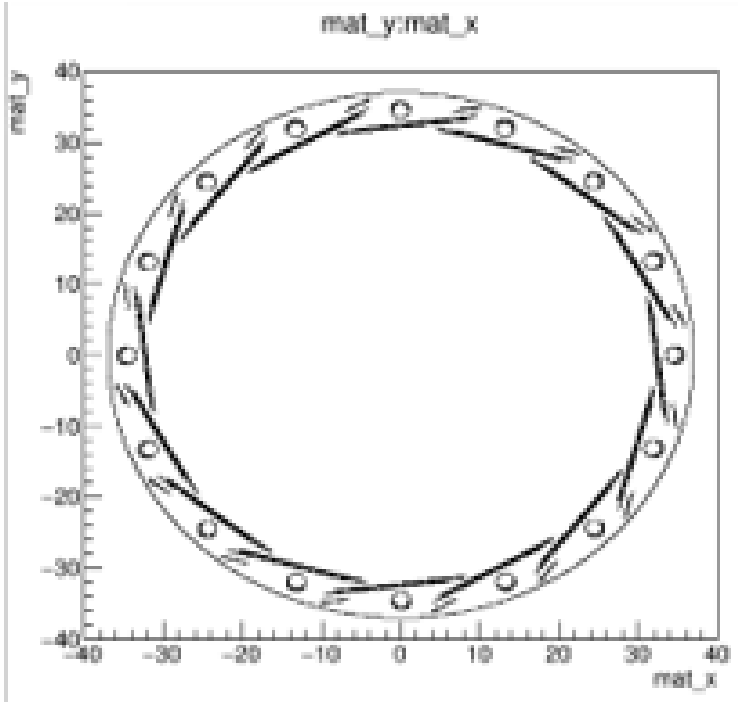
- Convert a (set of) cylinder(s) from pyg4ometry into Geant4 and FLUKA
- Test equality/validity of this conversion by comparing material budget

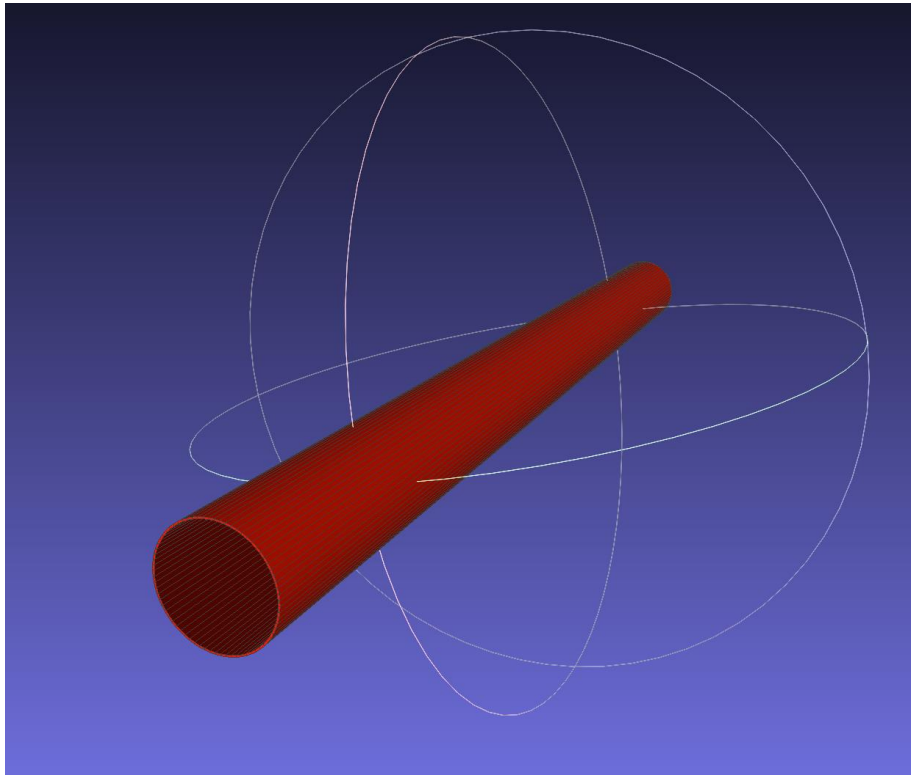




Part 2 – Geometry Simplification







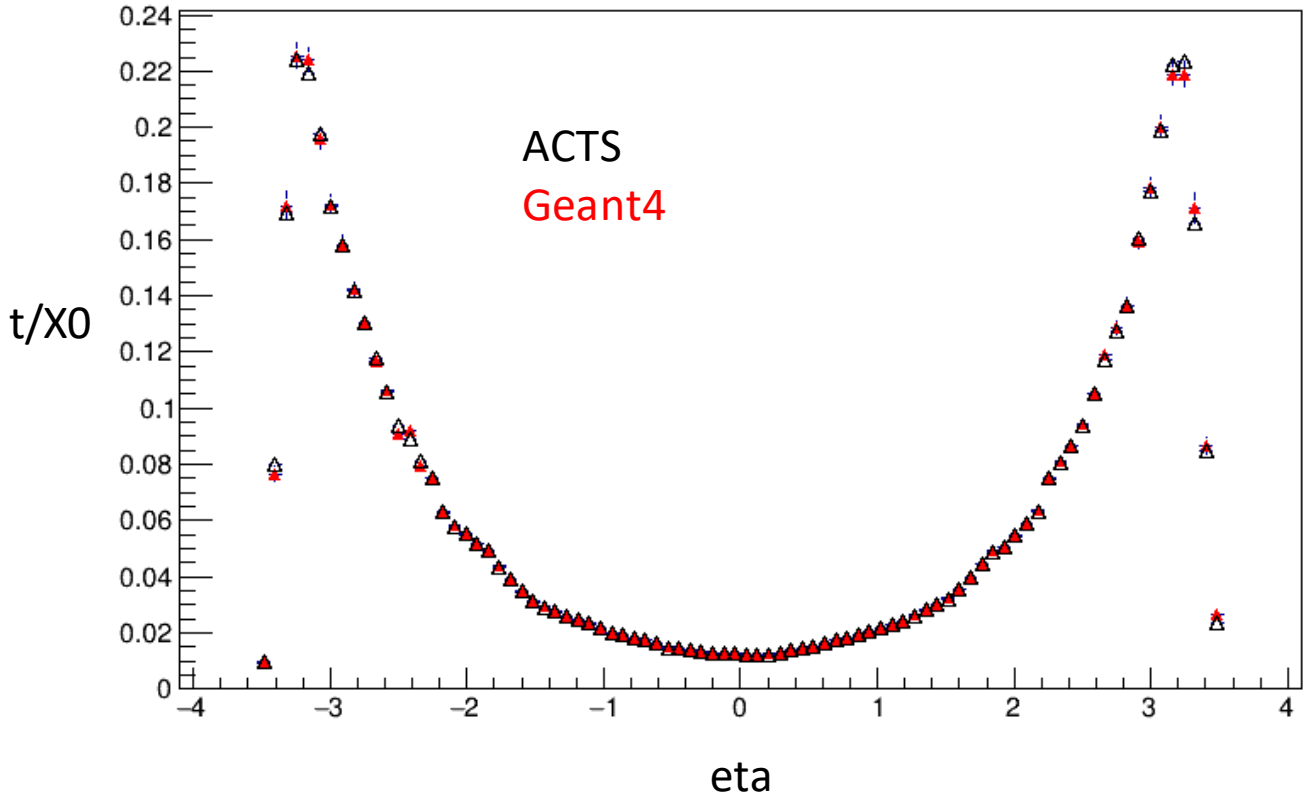
Material recording

Material mapping

Status & Outlook

- Established geometry conversion from pyg4ometry into Geant4/FLUKA
  - Yields same amount of material
  - Still issue with more than 6 layers in FLUKA
- Created a pipeline to use ACTS material mapping to perform the geometry simplification for FLUKA
  - Validated correct transcript of material amount
  - Missing back translation into pyg4ometry

https://github.com/asalzburger/flag



Thanks for listening!