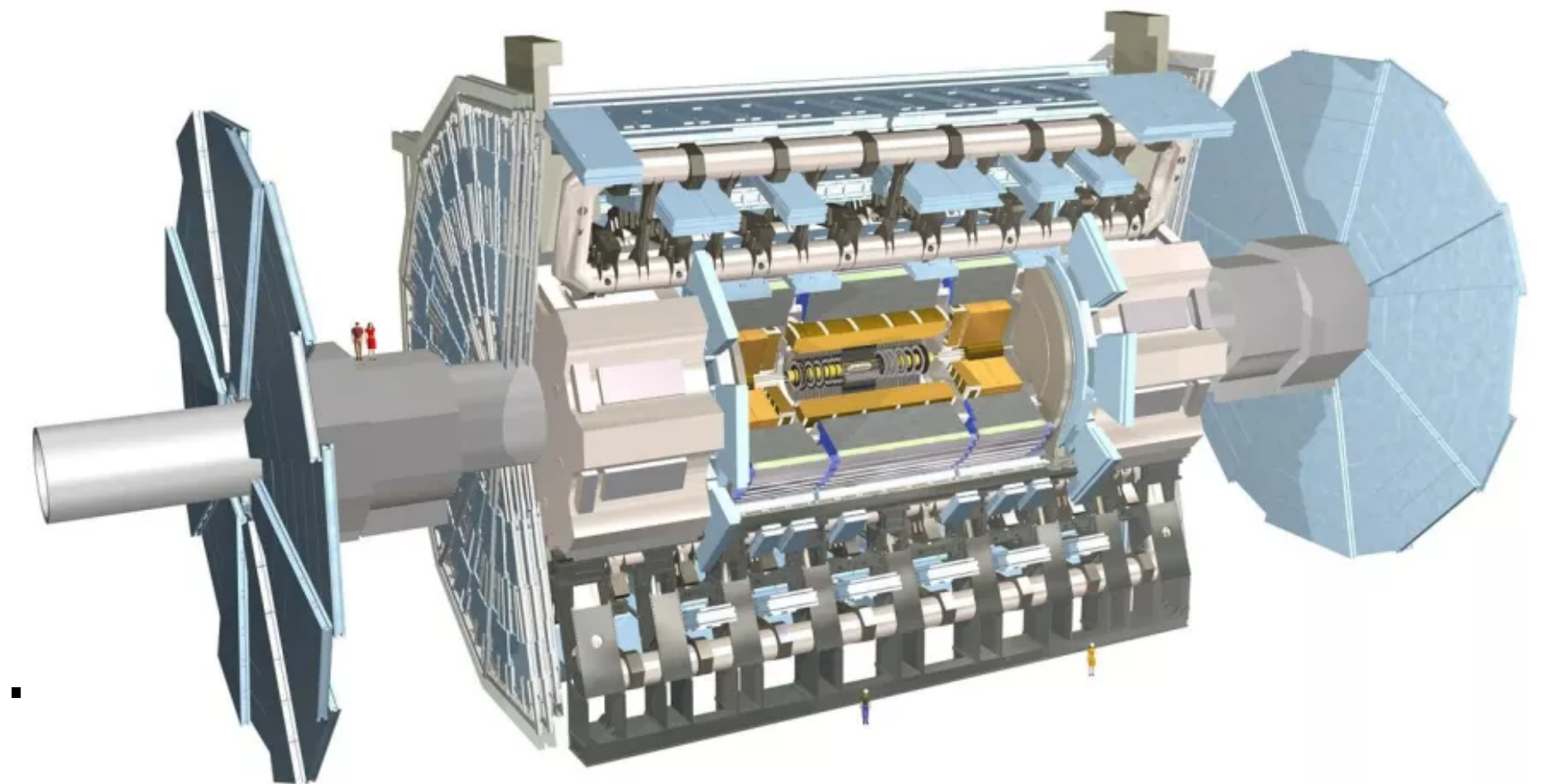


IMAPP internship proposals

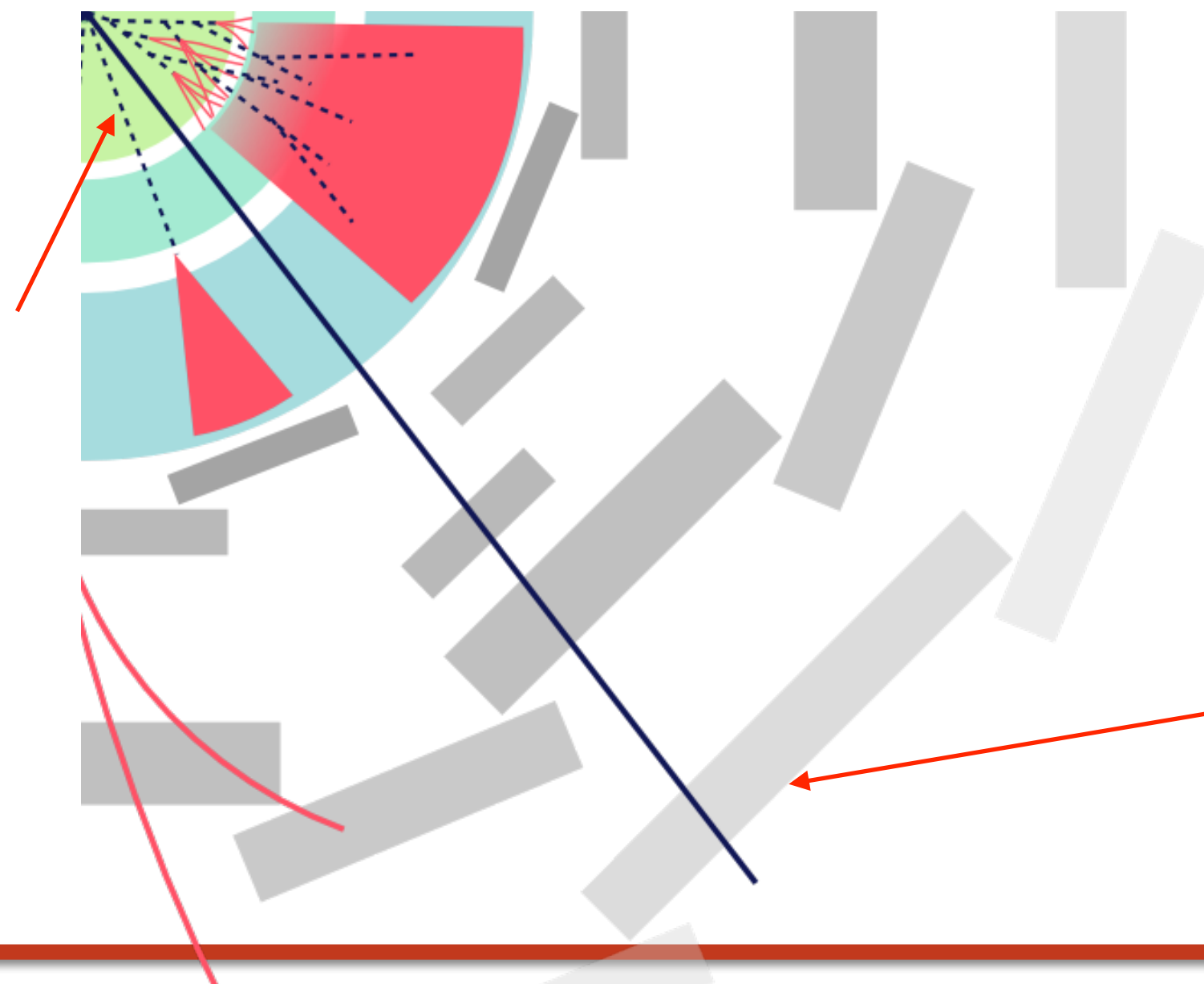
Laura Fabbri - Iacopo Vivarelli

Long-lived particles in ATLAS

- Many models of new physics predict charged, long-lived, heavy particles.
 - They can be produced at the LHC.
- c is 0.3 m/ns. ATLAS has a radius of 12.5 m. If $\tau \sim \mathcal{O}(30 \text{ ns})$, they'd look like a very heavy muon.



Large ionisation in the silicon detectors
(remember $dE/dx \sim 1/\beta^2$ at low momentum)

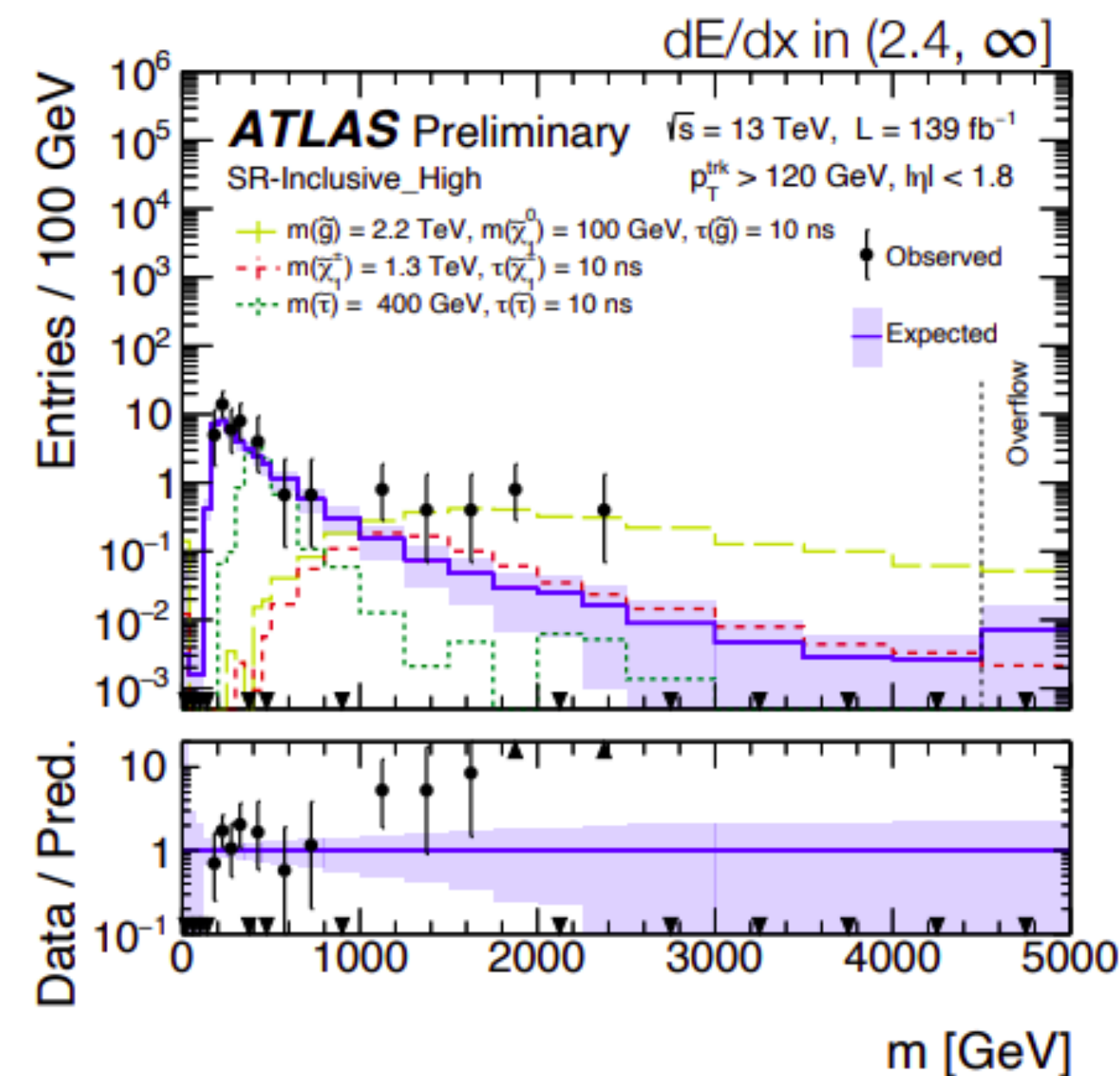


- We are focusing on the Time of Flight measurement

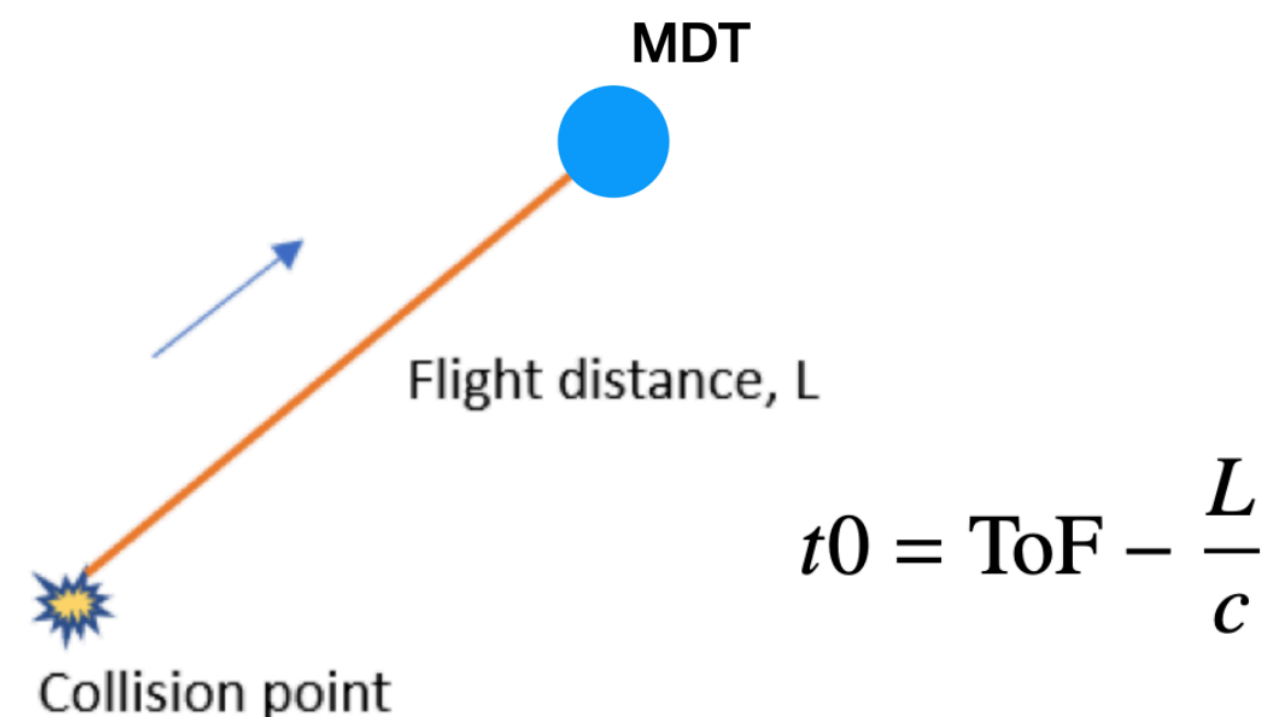
Slow particle: long time of flight to the muon spectrometer

What will you be doing?

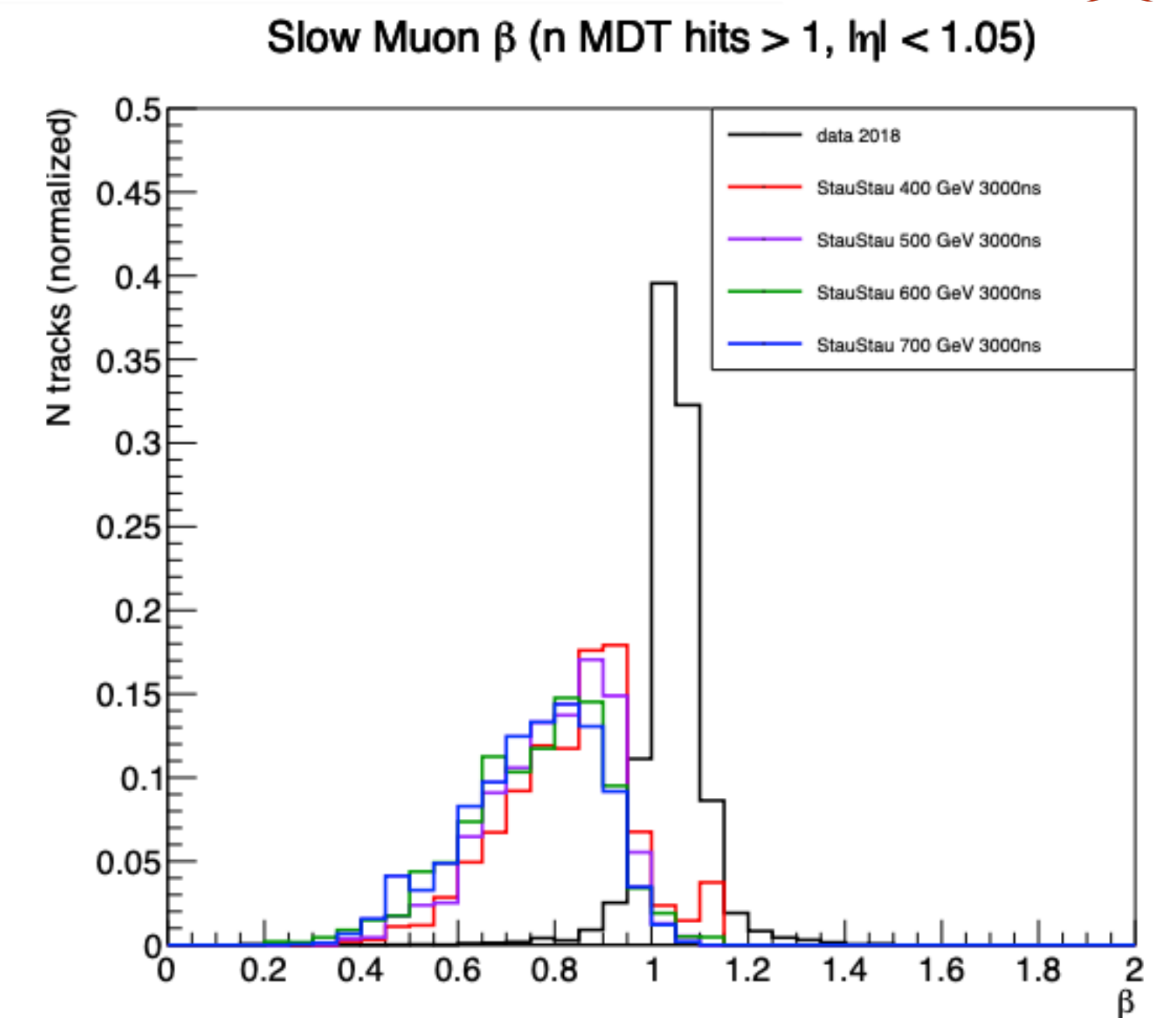
- **Project 1:** Explore **signatures and sensitivities** from different new physics models.
- **Project 2: Calibrate the muon spectrometer** with known events ($Z \rightarrow \mu^+ \mu^-$)
- Tools (some knowledge welcome, but not needed): A lot of python, some C++.
- Work environment: Based in the institute, but within an international analysis group.



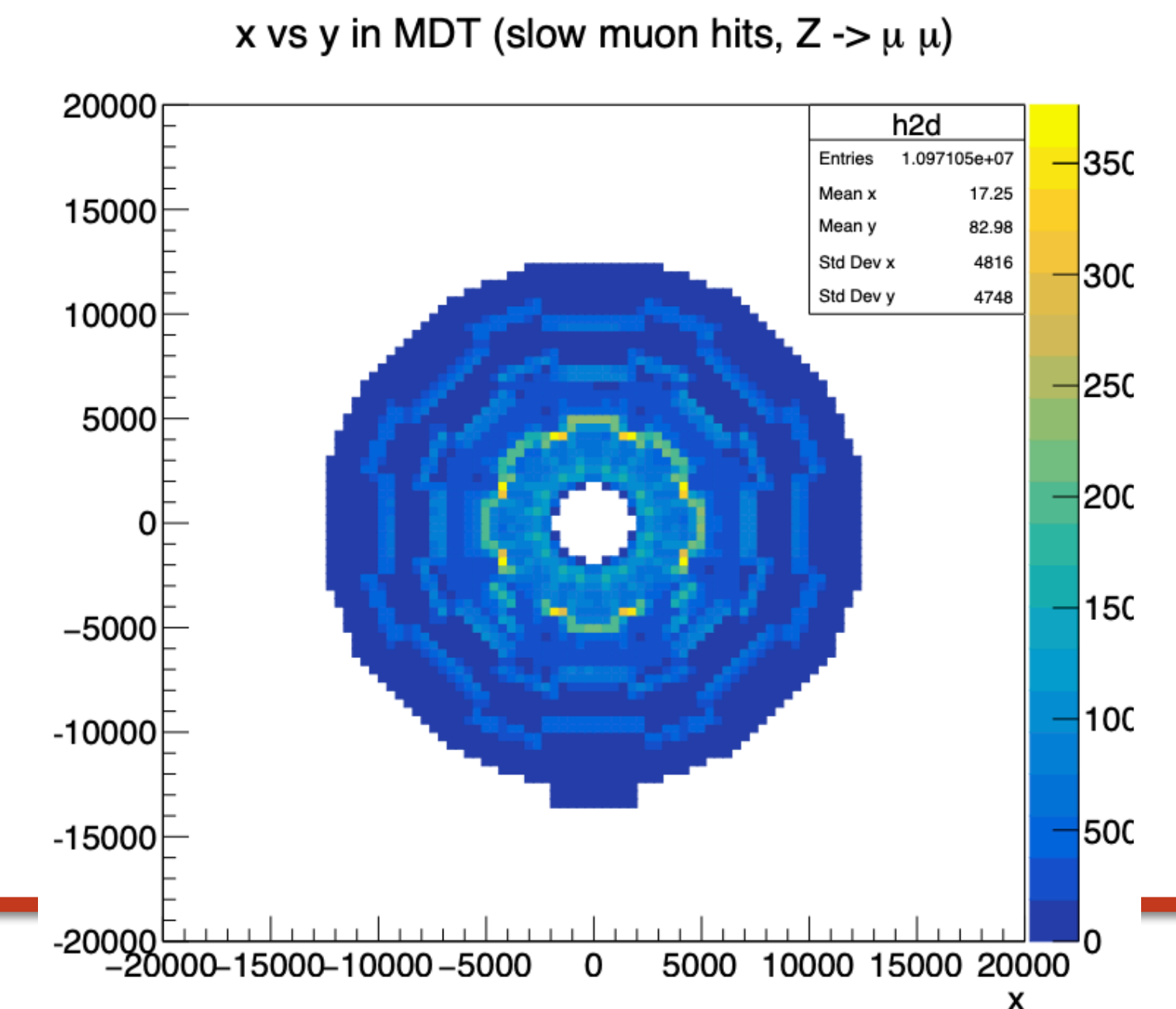
Using only ionisation



L. Fabbri/I. Vivarelli - 27 November 2024



S. Nechaeva (PhD student @UniBo)

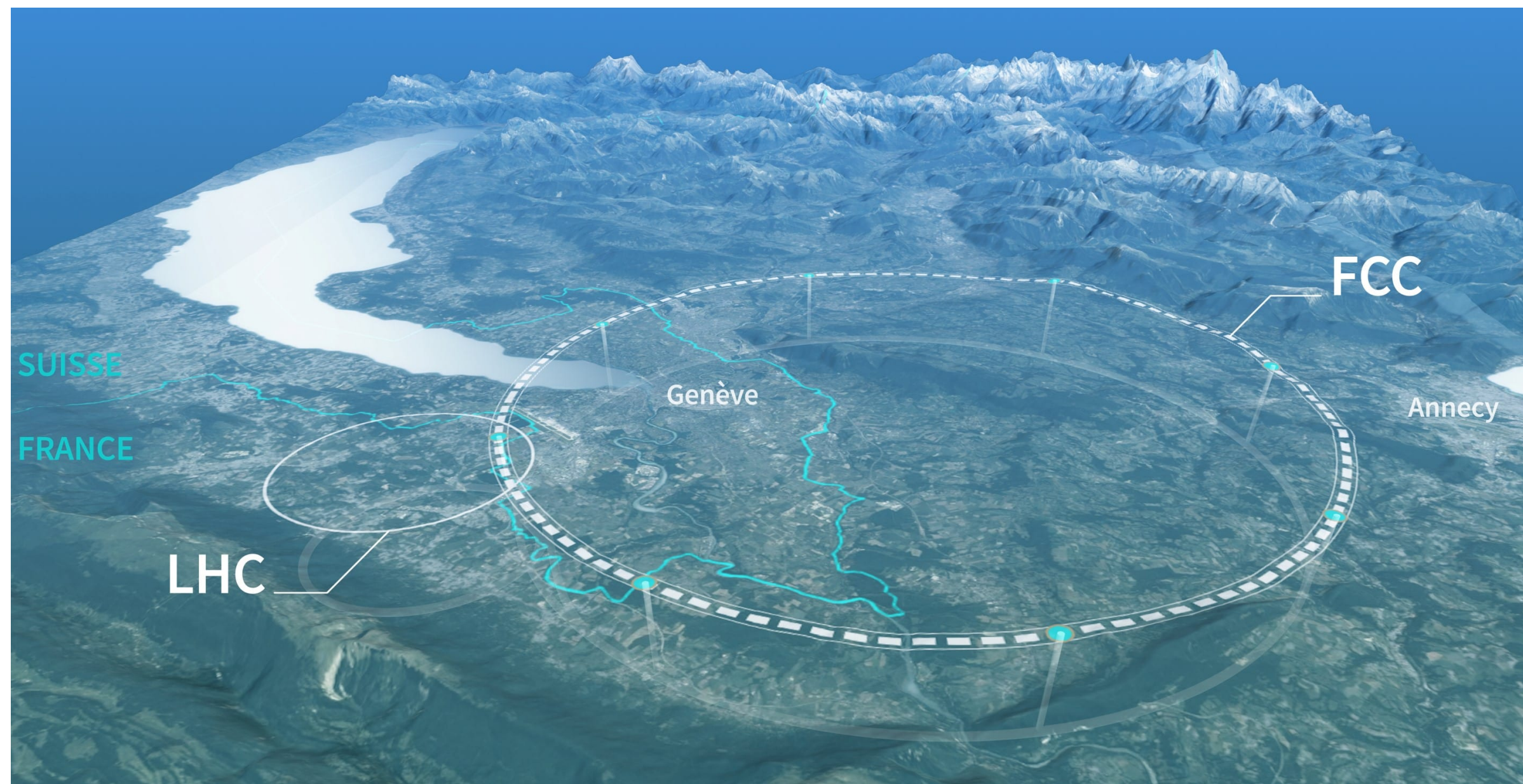


DRUM
GNA

FCC, IDEA, e HIDRA

FCC: the next generation.

100 km, e^+e^- @ $\sqrt{s}$ up to 375 GeV, then
 pp @ $\sqrt{s} \sim 100$ TeV



IDEA: a detector for FCC-ee

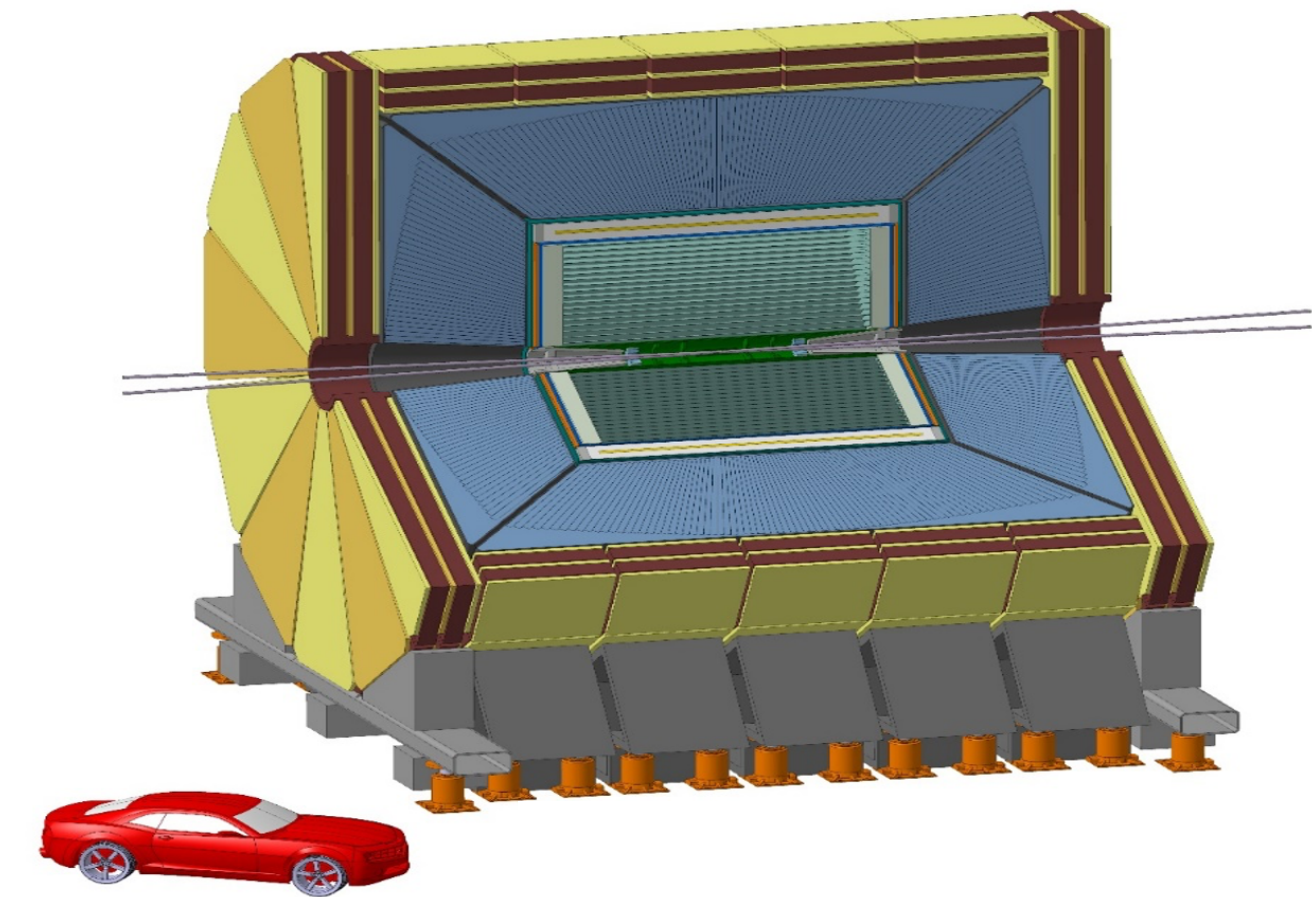
2 T thin solenoid within calo

Si vertex detector

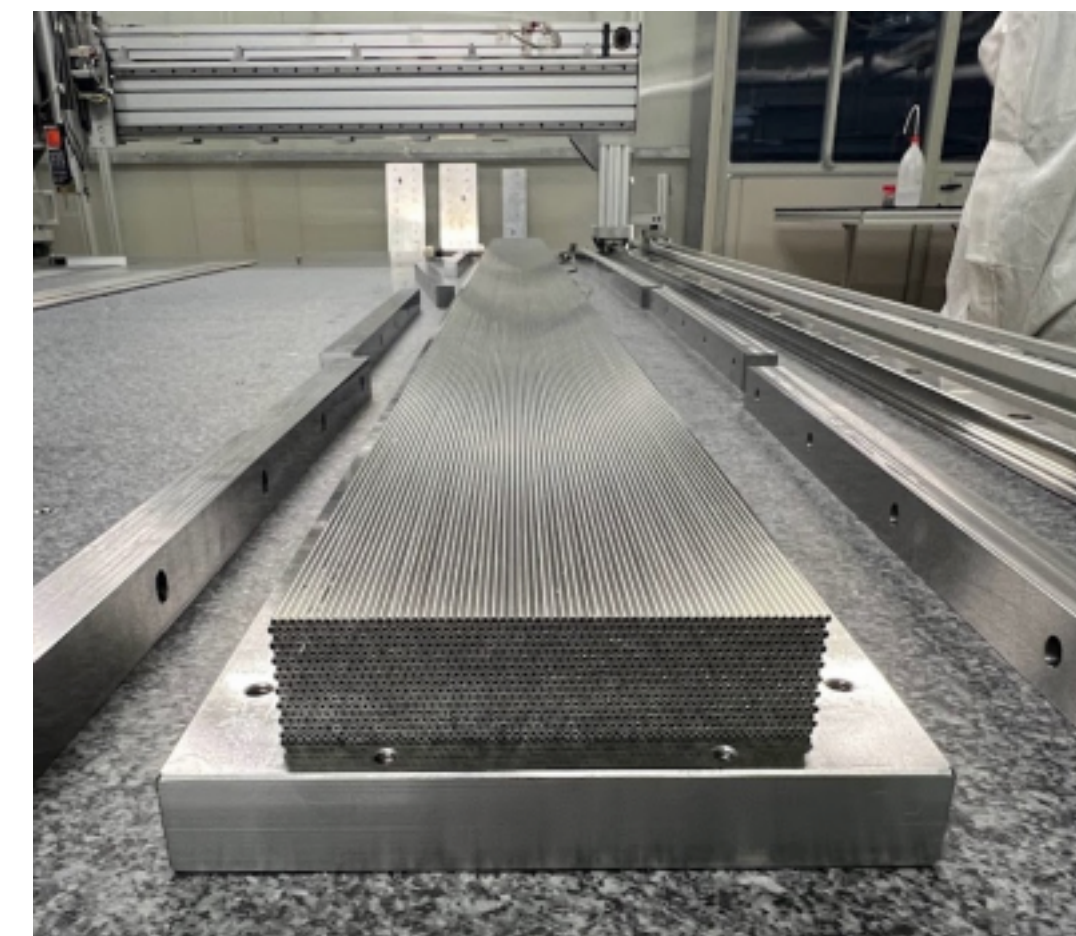
Tracking with ultra light drift chamber

Dual Readout Calorimeter + pre-shower

MPGD (μ Rwell) based Muon detector

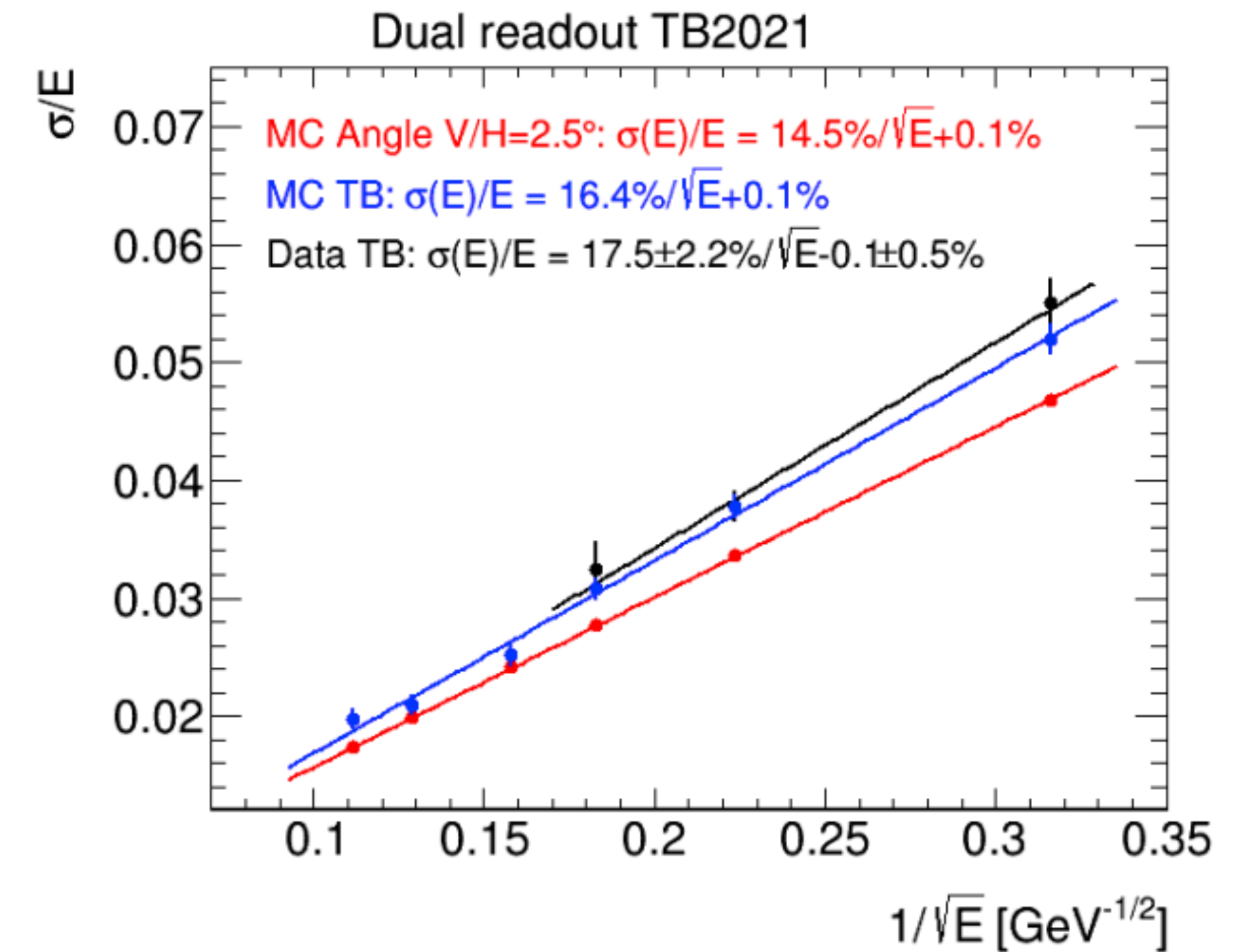
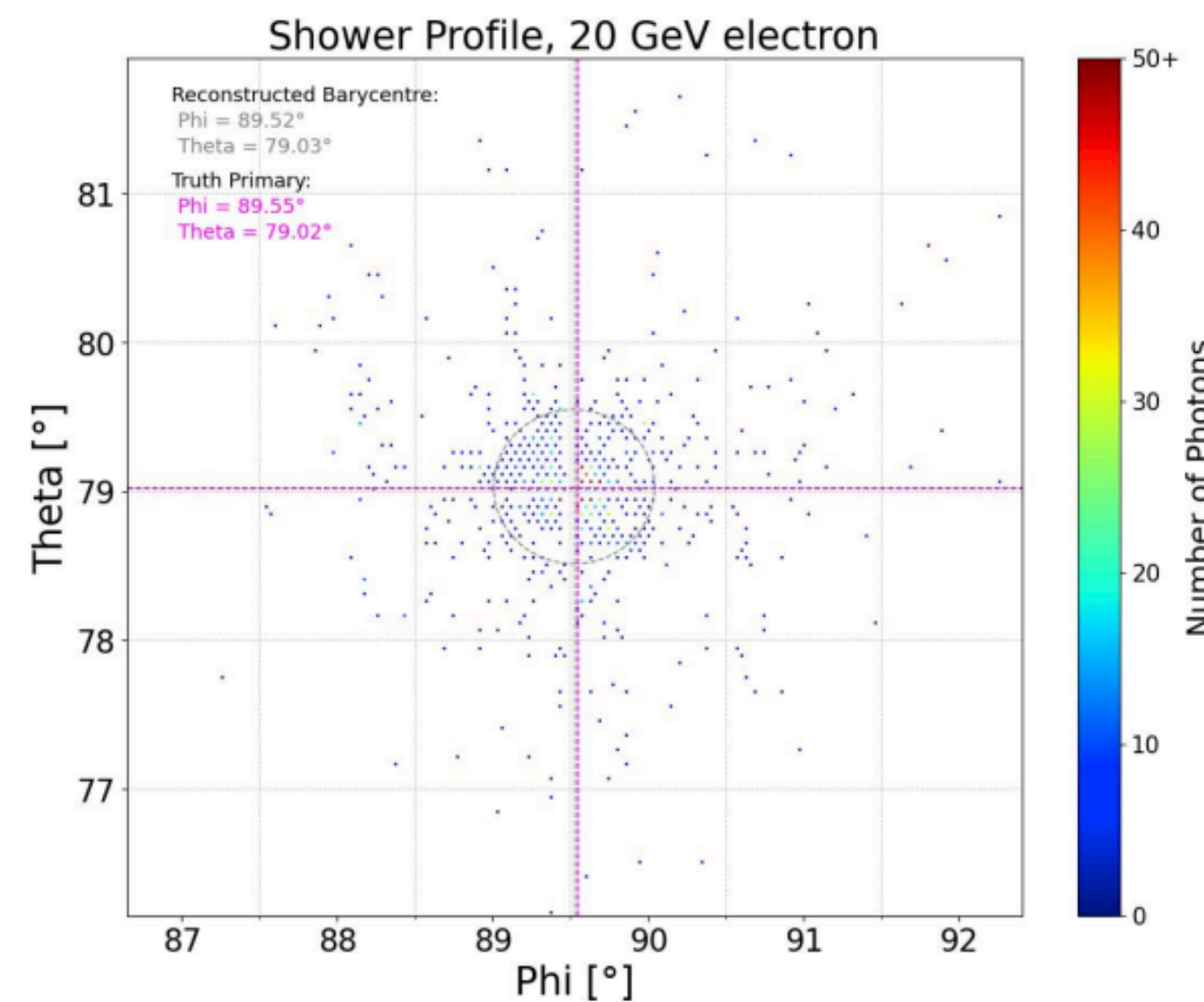
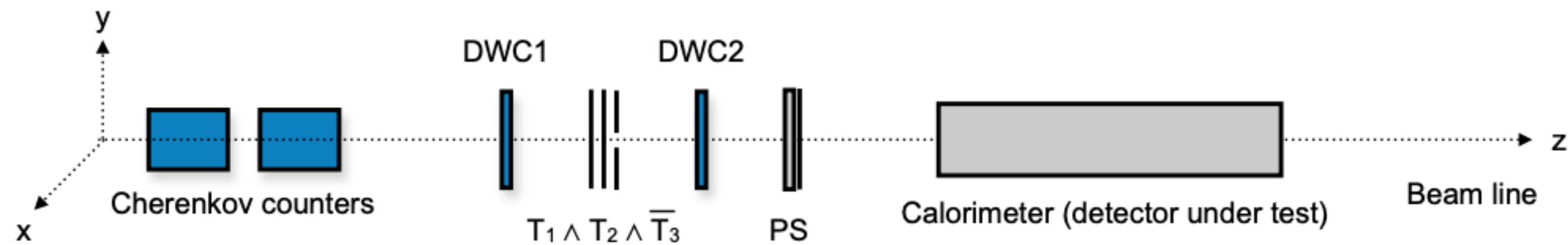


HIDRA: a prototype for the IDEA calorimeter



HIDRA test beam and simulation

Test beam 2024: the (preliminary)
HIDRA prototype under test



What you will be doing:

- Test beam data analysis.
- Performance studies using the idea full simulation

Contacts



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

- laura.fabbri@unibo.it - <https://www.unibo.it/sitoweb/laura.fabbri11>
- iacopo.vivarelli@unibo.it - <https://www.unibo.it/sitoweb/iacopo.vivarelli>