

LUXE Simulation, Analysis, Software

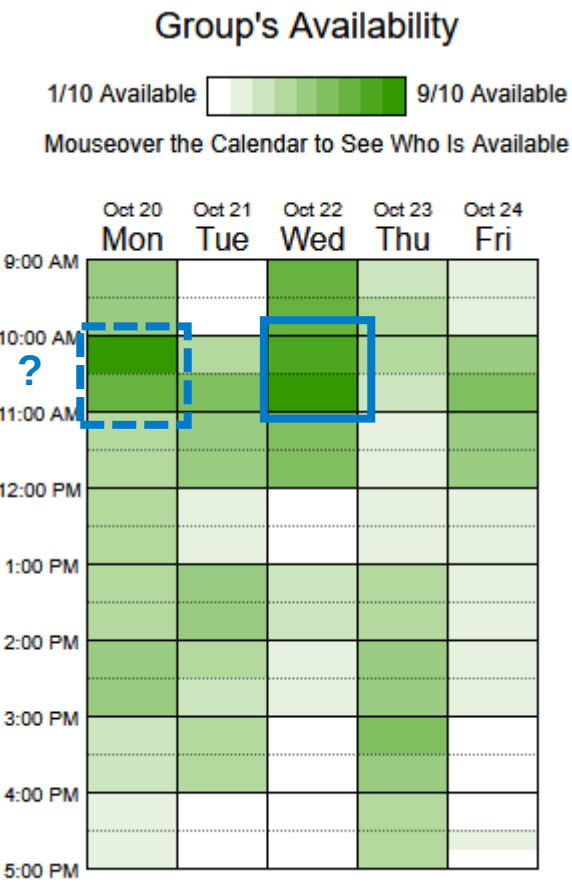
Ruth Jacobs

LUXE SAS meeting
22/10/2025

Intro & General news

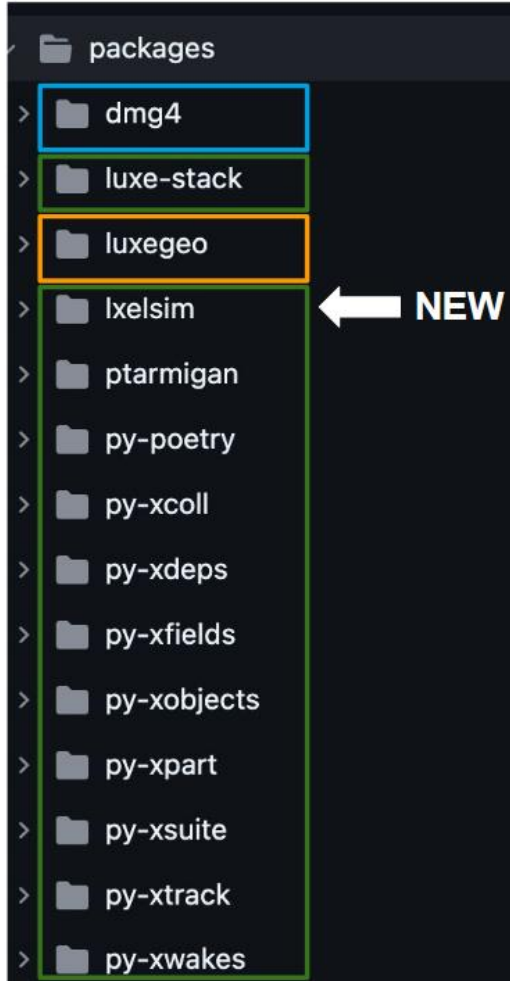
- Resume this meeting in bi-weekly rhythm
- Request to move from Wednesday 10AM to Monday 10AM
→ Opinions?
- Plan is to have roundtable and rotating updates (+ updates by request of groups)
- Preparing concept for ELBEX in XTD8 tunnel for review at DESY and EuXFEL
→ Will require summary of modifications for LUXE?

List of Topics
PTARMIGAN sim.
LUXE-ICS sim.
GEANT4, DD4HEP & model
FLUKA
Beam (+mon) sim.
Fast sim.
Data management
Calorimeter (ECAL-P)
Calorimeter (ECAL-E)
Tracker
Cherenkov
IP screen
Fwd screens
Upstream screen
Profiler
NPOD
Backscattering CALO



LUXE Software release

- LUXE software release available using docker images
→ more details in Federico's [talk](#) in main meeting



How do I use it?

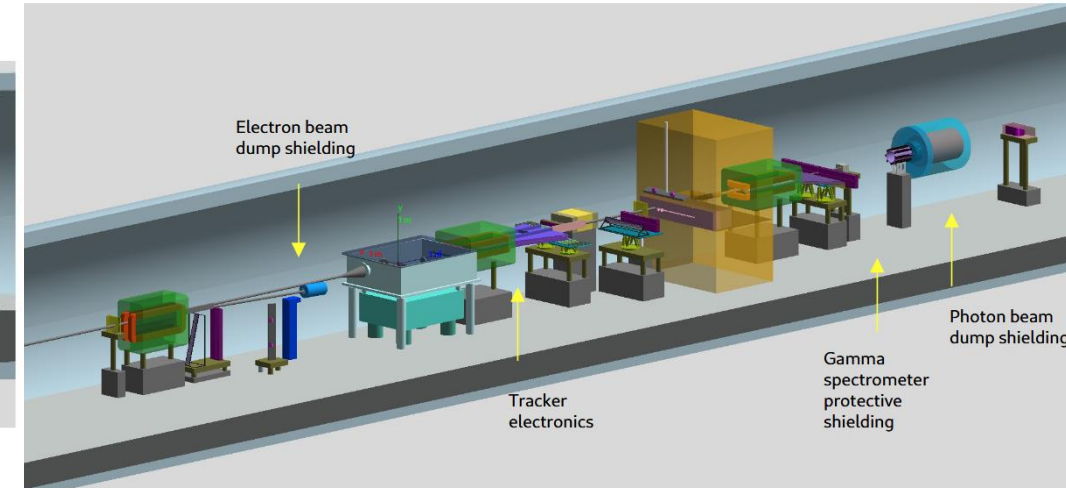
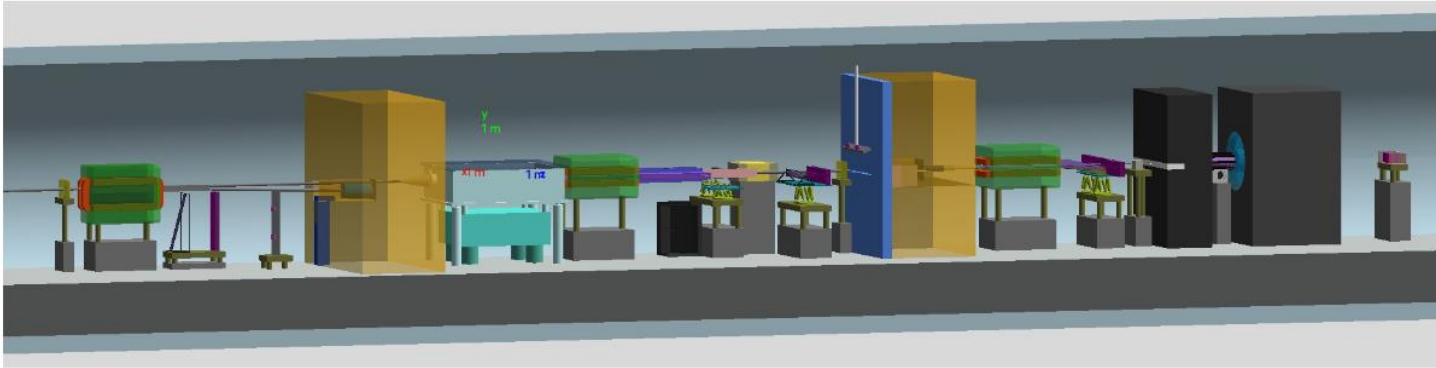
On your laptop / standalone setup:

```
> docker pull ghcr.io/luxesoftware/luxe-sw:latest (you only need to do this once!)  
> docker run -it -v /optional/local/folder:/target/in/image --rm  
ghcr.io/luxesoftware/luxe-sw:latest  
> setup_luxe
```

On a cvmfs-enabled machine:

```
> apptainer run /cvmfs/unpacked.cern.ch/ghcr.io/luxesoftware/luxe-sw:latest  
> setup_luxe
```

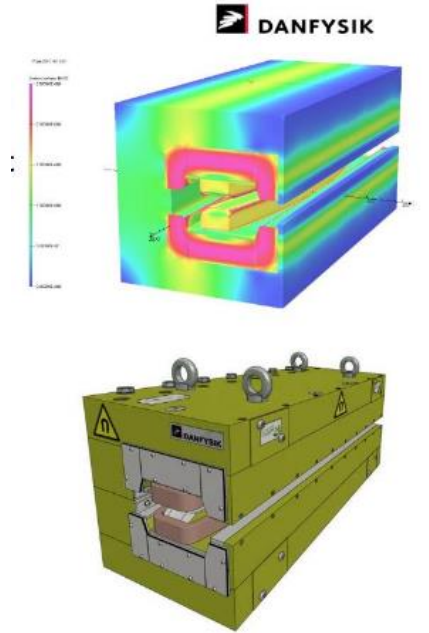
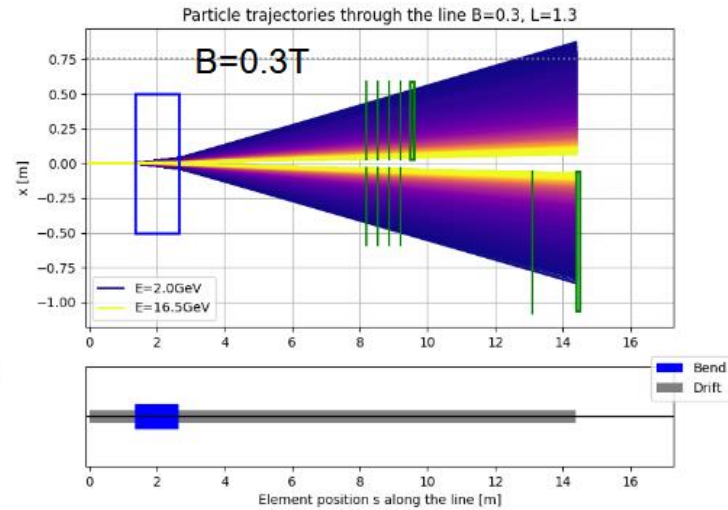
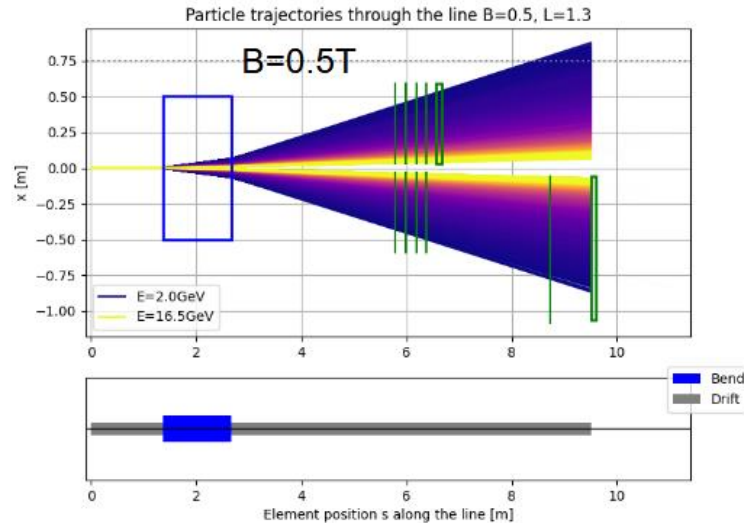
Quick workshop recap I



Summary

- First version of Geant4 LUXE geometry in ELBEX XTD8 tunnel is implemented and can be used for preliminary simulation.
- Only passive/protective components had to be modified. Detectors, beam pipes, magnets, IP and vacuum chambers remained the same and in the same relative locations.
- Ixelsim is on LUXE github.
- Possible studies:
 - Optimization of the shielding constructions dimensions and shapes;
 - Vacuum chamber implementation for bremsstrahlung monitor;
 - Address significant conversion rate in collimators of gamma ray spectrometer;
 - Study a possibility to use collimators for shaping the bremsstrahlung photons beam;
 - Longer space and usage of cleaning magnet could allow to use thicker target to enhance photon production if the high background problem can be solved in this way.
- Geometry optimization with new magnets (if they are).

Quick workshop recap II



Summary

- Xsuite Fastsim allows to study different LUXE spectrometer geometries with quick turnaround
- Still pretty crude, work ongoing to add a bit more realism (magnet apertures etc.), geometry could be handled much better etc.
- Weaker magnets are an option for LUXE while keeping detector geometries → longer setup
- More changes to LUXE with move to XTD8 require studies: Front-end electronics in the tunnel, photon beampipe through the whole LUXE beamline, NPOD?
- How do we want to approach the optimization for LUXE?