MC for GBP:
current status and workplan

Standalone MC for the LUXE GBP
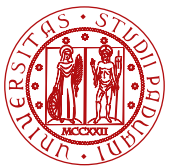
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Status of GBP MC sim. for LUXE

- Simulated the profile of energy depositions in the GBP from Compton photons arriving at the profilers from the IP.

- The amount of absorbed dose has been simulated in MC and it agrees with the estimates given in the older TN version.

- Background analysis must be improved using an initial beam of particles with higher statistics.

- We have to switch hadronic interactions on, moving to the FTFP_BERT/QGSP_BERT hadronic list.

- Allpix2 simulations have been delayed of few weeks, with respect to the original schedule. At the present time, allpix2's parameters for sapphire have been validated using the literature [1504.04023v2].

Main questions to address

1. What is the **detector accuracy** in measuring \xi, intensity?
   – What is the impact of detector geometry (thickness) and strip layout (strip width & spacing) on detector accuracy?
   – What is the performance of the II station and the I+II stations combined?
2. How long can a detector work on the LUXE gamma beam? (**radiation damage**)
   – Assumed that we can perform three independent measurements of the radiation damage with:
     - electron gun and X-ray source to measure the IEL induced damage
     - high energy electron beam at Elbe to measure IEL and NIEL effects
     - neutrons produced at the TIGRA nuclear reactor ([link](#)) to assess purely NIEL related damage
   – Necessary steps:
     - check that NIEL is reproduced with sufficient reliability
     - data on beam configurations (generation of e-laser, gamma-laser events at LUXE)
     - check impact of threshold values and systematic effects of algorithm based on highest localized dose
3. What are the best operating conditions to apply to the GBP? (**GBP setup**)
4. What is the size of the beam in LUXE gamma-laser mode? (**γ-laser**)

Priorities for the MC

- Geant4 sim. for alpha particles (energy loss in air)

- Allpix2 simulations
  - for LUXE, with the electronics under consideration (April)
  - for alpha particles (March)
  - Parameter validations for Allpix2. Results from sim. of [1504.04023v2](#) (February)

- Background study with higher statistics for the initial beam (when available)
  - Simulate LP \xi = 5, 10 in Ptarmigan (Kyle)
  - Propagate the particles from the IP to the GBP

- An easy task is to repeat the TN analysis but using FTFP_BERT physics list to look for effects of the hadronic interactions. (Simulation time for a BX with 1.7×10^9 is of the order of 1h)

- MC for ELBE
  - Geometry of the detector (sapphire, pcb)
  - Parameters of the test beam

Priority