New extended example dmparticle

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Dark matter particles

The minimal set of left hand fermions includes N_1, N_2, N_3 light objects having very weak coupling with standard fermions and bosons

Interactions of left hands fermions are very similar to electromagnetic and weak interactions of standard fermions and bosons but with different coupling constant

ShiP Experiment at CERN
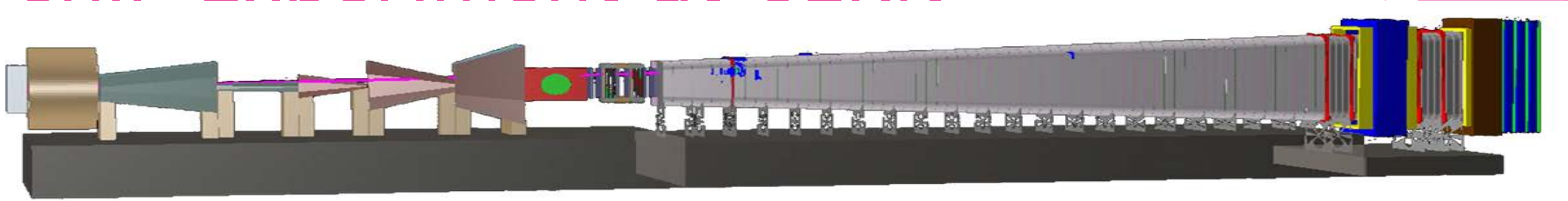
- The SHiP Experiment is a new general-purpose beam dump facility at the SPS

- Search for dark matter, neutrino oscillations, and the origin of the full baryon asymmetry in the Universe

- It is aimed at searching for very weakly interacting long lived particles including Heavy Neutral Leptons (HNL) or Light Dark matter particles (LDM)

- Background is neutrino flux and residual muon flux
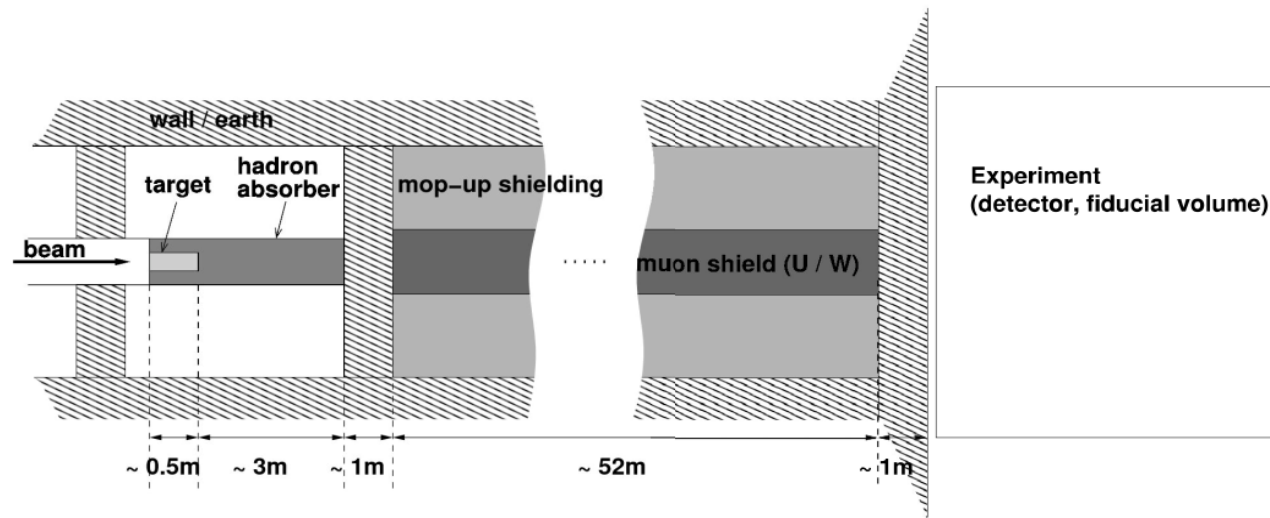
New Geant4 extended example

- $G4INSTALL/example/extended/exoticphysics/dmparticle
  - New example created for run in MT mode
- It is a preliminary and simplified LDM particle creation and interaction
- New particles can be G4LDMPhoton, G4LDMHi and G4LDMHiBar
  - Particle masses should be defined in command line
    - before G4MTRunManager is created property of LDM particles should be defined
- Physics List include components:
  - EM physics from standard builders
  - Decay physics
  - LDM physics
    - For today only bremsstrahlung process creating G4LDMPhoton is implemented
    - Base class G4MuBreamsstrahlung
- Geometry – a simple target with size and material defined via UI commands

Plans beyond 10.4

- Implementation of new LDM models
  - Enable various mechanisms of LDM production
  - EM interactions of LDM particles
  - Variable coupling between LDM and standard particles
- Add neutrino interactions
- Study of biasing with natural space distribution of rare events
  - Embedding realistic space distribution of LDM and neutrino forced interactions
  - Introduce more complex geometry