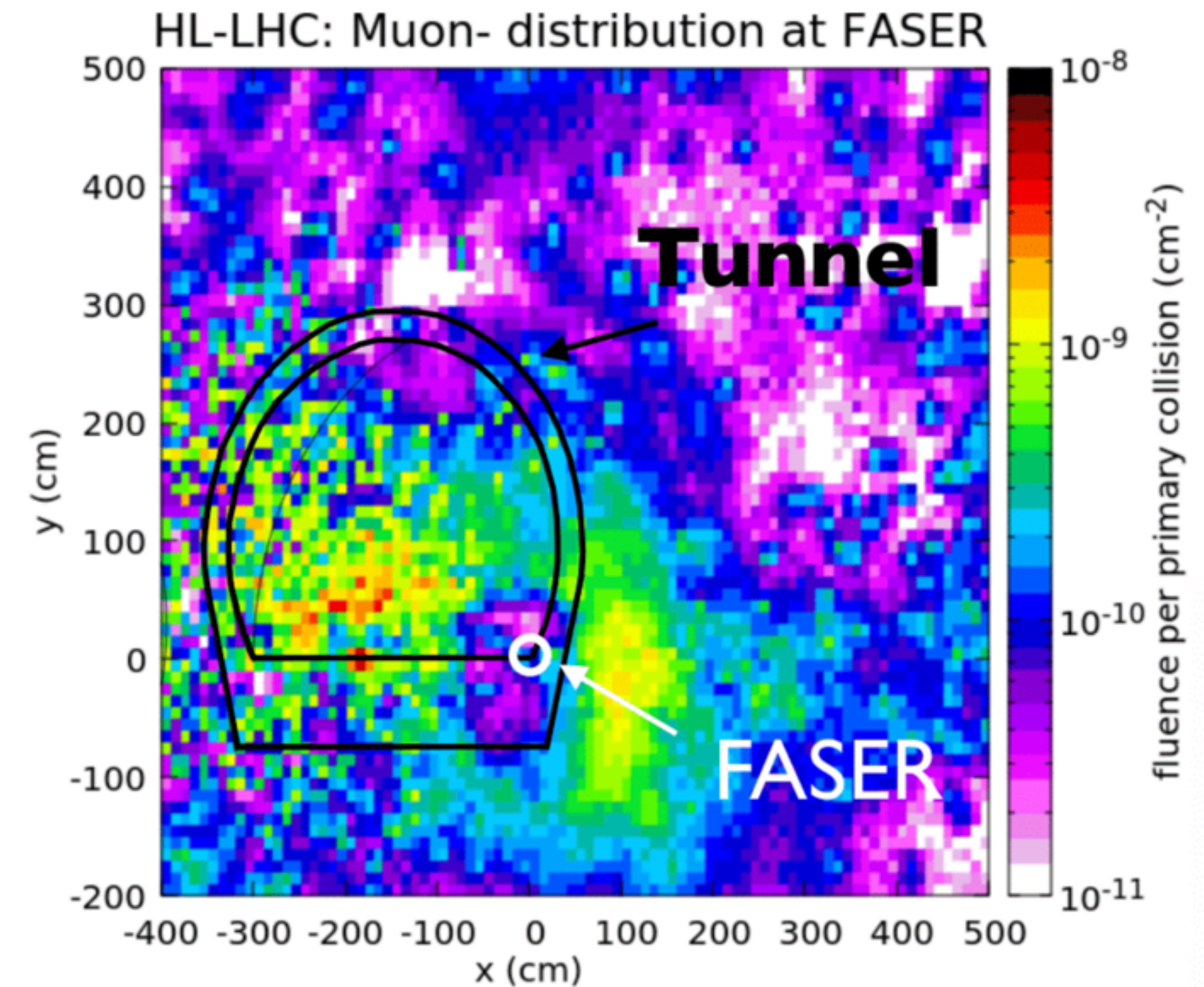


# Background

## Consideration on FASER background

- A residual **muon flux** (tens of Hz) still passes through the tunnel.
  - They can produce **secondary showers** via bremsstrahlung, pair production, or nuclear interactions.
- Background Simulations at FASER
  - FLUKA simulations by CERN EN-STI group.
  - Include effects of LHC magnets & infrastructure.
  - Simulated particle fluence rates at 13 TeV, normalized to  $L = 2 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ .
  - Muon flux higher off-axis due to LHC optics.
  - FASER placed in a *low-flux region* of TI12 tunnel → reduced background.
- Cosmic Rays: Negligible in comparison to beam-related particles.



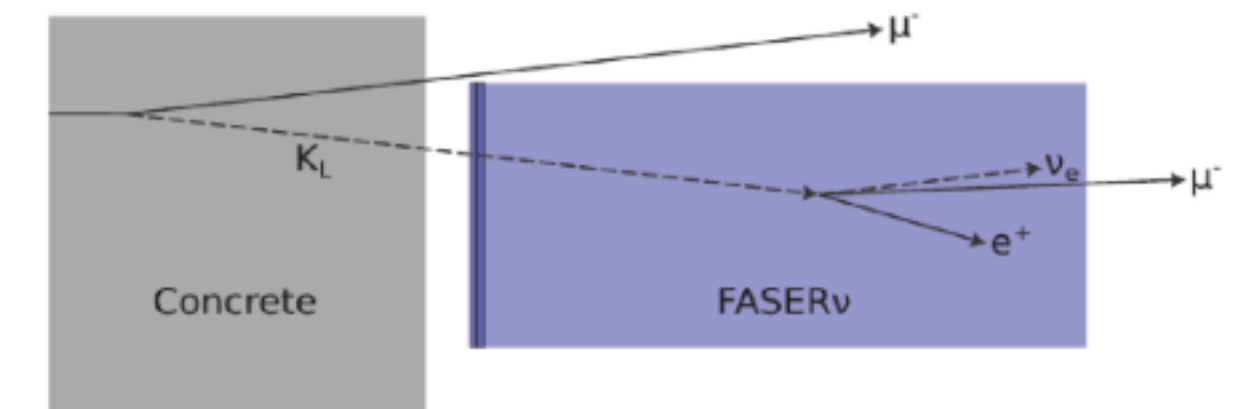
\*Fluence ( $\Phi$ ) is the number of particles crossing a unit area.

# Background

## Consideration on FASER background

- Veto System in front of the detector: tells if a particle came from outside.
- 1. Neutral hadrons, but assume it misses veto system
  - Most neutral hadrons absorbed in tungsten without producing high-momentum track
  - Only a tiny number can fake a neutrino: **Expect  $0.11 \pm 0.06$  events**
- Scattered muons that miss veto system (rare) :
  - These are muons from the LHC that scatter a bit before reaching the detector.
  - **Expect:  $0.08 \pm 1.83$  events**

1)



2)

