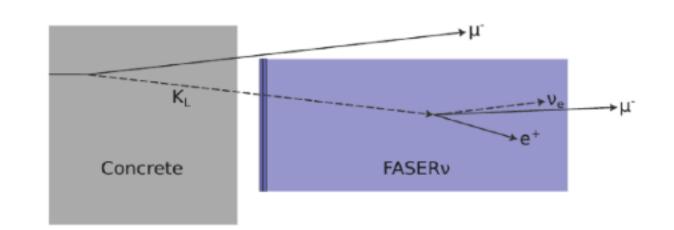
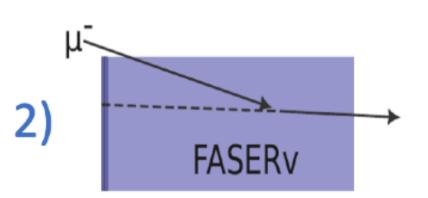
## Background

## Consideration on FASER background

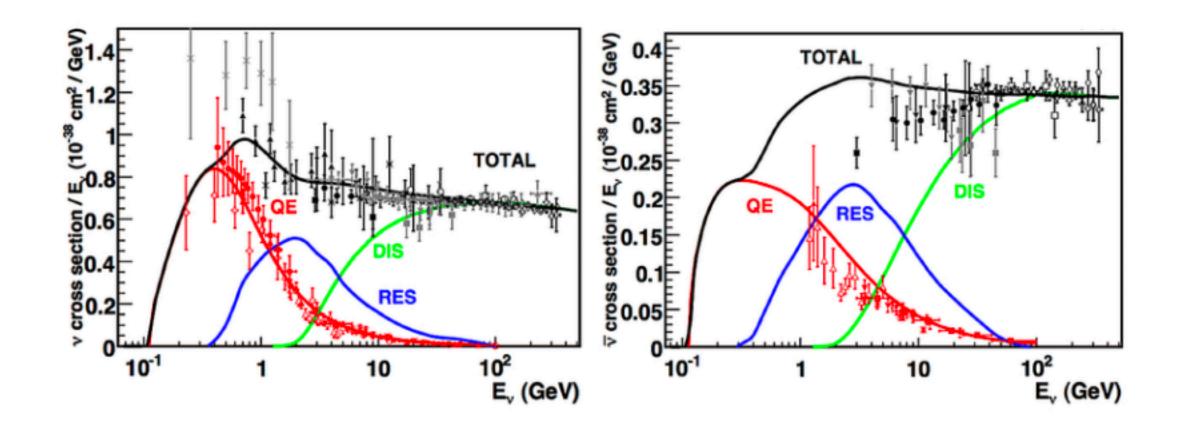
- Veto System in front of the detector: tells if a particle came from outside.
- 1. Neutral hadrons, but assume it misses veto system
  - Most neutral hadrons absorbed in tungsten without producing highmomentum track
  - Only a tiny number can fake a neutrino: Expect 0.11 ± 0.06 events
- Scattered muons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





## **Neutrino Interaction in matter**

## Pipeline



- Quasi-Elastic (QE) Scattering: the interaction's resolving power is insufficient to probe the internal structure of the nucleon. The neutrino elastically scatters off the nucleon, changing its type but leaving it intact. (v<sub>µ</sub>+ n→µ<sub>-</sub>+ p)
- Resonant (RES) Pion Production: momentum transfer becomes large enough to excite the target nucleon into a short-lived baryonic resonance, such as the Δ(1232), that quickly decays (ν<sub>μ</sub>+ p→μ<sub>-</sub>+ Δ → μ<sub>-</sub>+ p+ π)
- Deep Inelastic Scattering (DIS) ≈5 GeV: the fourmomentum squared transferred by the virtual boson, Q₂, is large enough that the interaction resolves the quarks and gluons inside the nucleon