

Calibration Sources

Beam induced & Atmospheric

- ν_{μ} CC events
- Stopped muons
- Stopped protons
- Michel electrons
- beam induced rock muons
- Muons from atmospheric neutrinos
- Muons from atmospheric neutrino-rock interactions
- Other decays (e.g. Kaons)
- Neutral pions
- ...

Cosmic rays

- muons
- stopped muons
- APA-CPA crossers
- APA/CPA piercers
- Michel electrons
- Other decays
- ...

Other

- Ar-39
- Ar-42
- Purity Monitors
- Temperature Monitors
- Current Monitors
- Past Experiments
- ...

External Calibration systems one can consider

- Laser System
- Radioactive sources
- External Neutron source
- Photon Detector Calibration system
- Cosmic Ray Tagger (CRT)
- Field response calibration device

Note:

- Each calibration source comes with its own challenges
- Option of multiple ways to calibrate helps
- Past experiments: *ICARUS, MicroBooNE, 35-ton, LArIAT, ProtoDUNEs etc.* To what extent do we can we rely on ProtoDUNE?