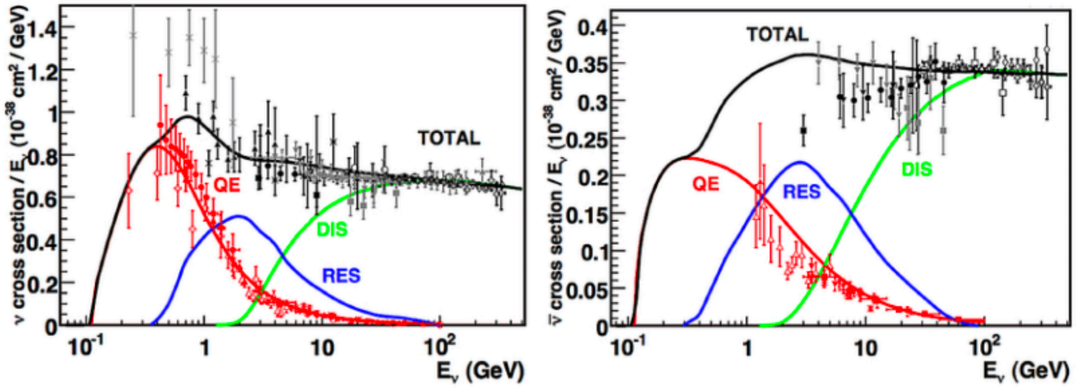
Neutrino Interaction in matter

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. ($\nu_\mu + n \rightarrow \mu^- + p$)
- **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* ($\nu_\mu + p \rightarrow \mu^- + \Delta \rightarrow \mu^- + p + \pi$)
- **Deep Inelastic Scattering (DIS) ≈5 GeV:** the four-momentum squared transferred by the virtual boson, Q^2, is large enough that the interaction resolves the quarks and gluons inside the nucleon

Material of Cube; scinitllator?

Pipeline

- 10 planned modules: 20 layers of 50x50 of 1 ×1 ×1 cm^3 optically isolated plastic scintillator cubes (voxels).
- *The scintillator material:* follows the composition used for its predecessor, the *SuperFGD*
  - *P*olystyrene base doped with 1.5% p-terphenyl (PTP) as a primary fluor and 0.01% POPOP as a secondary wavelength shifter.
- *After production:* reflective layer on the surface, by chemical etching, forming a 50–80 μm thick white microporous polystyrene coating.
- 1.5 mm orthogonal holes for *Wavelength-Shifting (WLS) fiber:*
  - Ensure an optimal light yield of approximately 30 photoelectrons per Minimum Ionizing Particle (MIP) for a single 1-meter-long WLS fiber