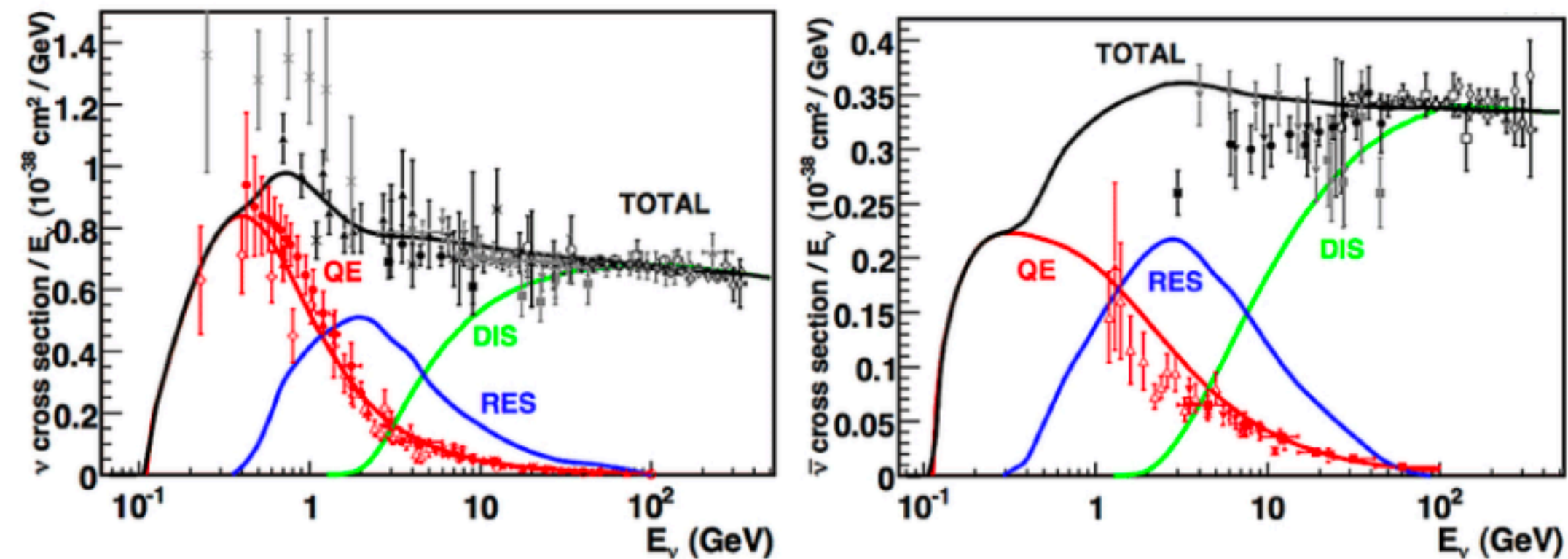


# Neutrino Interaction in matter

## 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  $\Delta(1232)$ , that quickly decays* ( $\nu_\mu + p \rightarrow \mu^- + \Delta \rightarrow \mu^- + p + \pi$ )
- **Deep Inelastic Scattering (DIS)  $\approx 5$  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; scintillator?

## Pipeline

- 10 planned modules: 20 layers of 50x50 of 1 ×1 ×1 cm optically isolated plastic scintillator cubes (voxels).
- *The scintillator material:* follows the composition used for its predecessor, the *SuperFGD*
  - Polystyrene 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