GNA fitter

- GNA — a fitter for comprehensive physical models with large number of parameters.
- Design is based on the Daya Bay experience.
- Dataflow programming paradigm: model is built as directed lazily-evaluated graph that operates on vectors.
- Implementation: C++ (core), Python (interface).

$$\chi^2 = (x - \mu(\theta, \eta))^T V_{stat}^{-1} (x - \mu(\theta, \eta)) + (\eta - \eta_0)^T V_\eta^{-1} (\eta - \eta_0)$$

x, μ — vectors with data and model prediction.
θ — vector with free parameters.
η — vector with uncertainties, propagated via penalty terms.
η_0 — default values of η.
V_η — error matrix for η.

Detector response impact on JUNO mass hierarchy sensitivity

- Non-uniformity: resolve the nPE/MeV change wrt radius by diving the whole detector into several layers and applying different energy resolution in each layer.
- Non-linearity: we can constrain the residual non-linearity by the fine structure in the measured spectra. For example, if an exponential residual non-linearity presented in the spectra, we can use a test quadratic formula to fit it.