**Comprehensive Model Configurations**

GENIE has always been a modular software where different models could be combined in different comprehensive configurations. Though not all the models are supposed to be used together.

- CMC are defined in order to easily identify sets of models and their corresponding parameters. New GENIE will provide a number of consistent CMC. Each of them will be validated against public data releases on neutrino scattering. Examples of supported CMC will be:
  - $\mathrm{G18}_0\_01$ series: adiabatic evolution of old default;
  - $\mathrm{G18}_0\_02$ series: improved empirical CMC using Beringer-Sehgal instead of Rein-Sehgal;
  - $\mathrm{G18}_1\_10$ series: theory driven configuration.

All these tunes consist together in GENIE and they can be selected with a simple command line e.g., `--tune G18_01a_00_000`.

**Modelling Single Pion Production**

The transition between RES and DIS interactions is relevant for neutrino fluxes around few GeV. In the plot it is represented as a function of the $W$ of the interaction.

The transition is a complex region to model: in GENIE this is done extrapolating the DIS contribution at low $W$ and rescaling it with some ad-hoc topology dependent parameters. A parameter ($\mathrm{Wcut}$) divides the $W$ range in two, one with pure DIS ($W > \mathrm{Wcut}$) and RES + scaled DIS ($W < \mathrm{Wcut}$).

**Global Fit and inclusive datasets**

![Graph showing vCC inclusive cross section vs. $E_{\nu}$ (GeV)]

- **vCC inclusive** ($10^{-38}$ cm$^2$/GeV)
  - v3.00/G18_01a_00_000
  - v3.00/DeuteronFit
  - v3.00/Rodriguez et al, EPJ C (2018) 79

**Global Fit and one pion exclusive datasets**

![Graph showing vCC inclusive cross section vs. $E_{\nu}$ (GeV)]

- **vCC incl.$(v, p \rightarrow \mu^+\nu\pi^+)$** ($10^{-38}$ cm$^2$/GeV)
  - v3.00/G18_01a_00_000
  - v3.00/DeuteronFit
  - v3.00/Rodriguez et al, EPJ C (2018) 79

**Conclusions**

- Genie v3 official release is close; a beta is already public. It will provide a number of configurations validated with respect to publicly available datasets and a set of tunes obtained with a dedicated machinery.

- An example of this machinery is presented in this poster. With respect to the old tuning of GENIE v2, the exclusive pion production channel were included in order to solve the known discrepancy of GENIE v2.

- This tune and similar ones for different models and different configurations will be released and maintained by the GENIE collaboration. Further details can be found in the manual and on the website.