

# *Genie User Forum*

*20 November 2019*




UNIVERSAL NEUTRINO GENERATOR  
& GLOBAL FIT

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On behalf of the GENIE collaboration



# *Genie Updates*



20 Nov 2019


GENIE Forum - M. Roda

# *Toward v3.2*

- Things keep getting into the master branch in preparation for v3.2
- Specifically
  - RES bug fixed – see last week
  - Update to Boosted dark matter modules



# *Complete Tune Results*



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# *This is not an official data release*

- A full tune release is not something we believe a good thing to do at this stage
  - General reasons
    - There is no full support as some parameters are not reweightable
    - Whatever error treatment will not be complete
  - Tune Specific reason
    - In this specific tune, one of the parameter is at the edge, so the Jacobian is no zero
    - Errors might not be extracted properly from the fit
- Should not be used in any official context
  - Happy to let you experiment
  - We would like to encourage the development of systems that could reweight all the parameters

# *What is available*

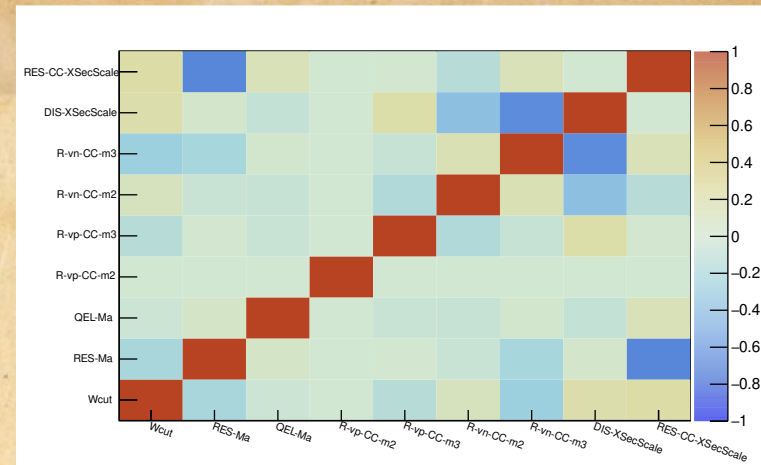
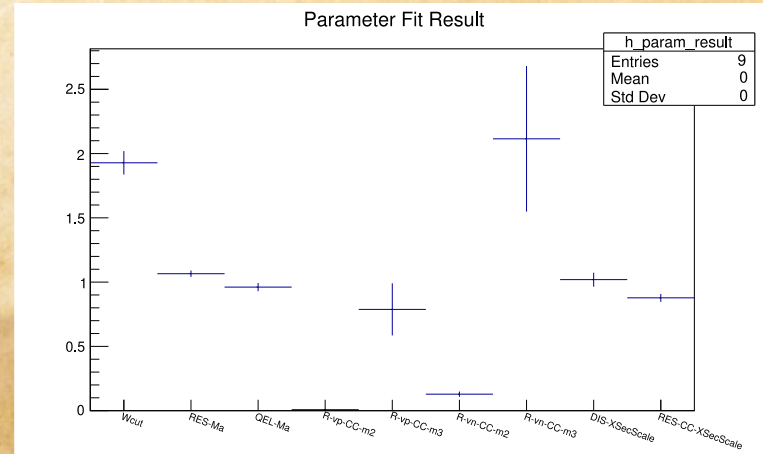
- There is not much that comes out of a tune
  - Results – dedicated root file
  - Some files that can give you the possibility of understanding exactly which points have been used for the fit
    - It is a bit tricky
    - As I said all this material is not supposed to be released
- The material is available at the docdb of today's forum

# Tune results

- Tune – G18\_02a\_02\_11a
  - What you already have is the central values
  - Available in  
\$GENIE/config/G18\_02a/G18\_02a\_02\_11a/CommonParam.xml

- Wcut 1.927882 +/- 0.091380
- RES-Ma 1.065041 +/- 0.024707
- QEL-Ma 0.961288 +/- 0.031771
- R-vp-CC-m2 0.007600 +/- 0.000000 ( +/- 0.000010 )
- R-vp-CC-m3 0.787691 +/- 0.202721
- R-vn-CC-m2 0.127861 +/- 0.020716
- R-vn-CC-m3 2.114811 +/- 0.565942
- DIS-XSecScale 1.019012 +/- 0.054536
- RES-CC-XSecScale 0.877296 +/- 0.030771

- R-vp-CC-m2 is the parameter that is at the limit



# *The tuned parameters*

- One parameter in the fit might correspond to more parameters at the generator level
  - The multiplicity issue arises for the R parameters
  - The parameters are implemented as different parameters in the generator
  - Theory suggests that they are supposed to be the same
    - The present fit follow this idea
    - Things might change in the future
  
- R-vp-CC-m2
  - DIS-HmultWgt-vp-CC-m2
  - DIS-HmultWgt-vbn-CC-m2
  
- R-vn-CC-m2
  - DIS-HmultWgt-vn-CC-m2
  - DIS-HmultWgt-vbp-CC-m2
  
- R-vp-CC-m3
  - DIS-HmultWgt-vp-CC-m3
  - DIS-HmultWgt-vbn-CC-m3
  
- R-vn-CC-m3
  - DIS-HmultWgt-vn-CC-m3
  - DIS-HMultWgt-vbp-CC-m3



# Content of the ROOT file

- Central values for each parameter
  - h\_param\_result (the error is the error coming from the fit, see slide 7)
  - Also TvectorD called param\_result
- Full covariance
  - param\_covariance (TmatrixSymD)
  - Histogram format in which the entries are more clear – h\_param\_covariance
  - Also available the correlation in h\_param\_correlation
- The predictions of the fit result for each point for which we have the prediction
  - h\_global\_pred\_MC\_err
  - h\_global\_pred\_sys\_err
- Full covariance from the propagation of the errors on the parameters
  - h\_global\_pred\_cov and h\_global\_pred\_cor

# Decoding the data we used

- Observables in those files are only identified by a number - the bin number
- The key for the decoding if a point is used and which point it is (according to a paper) is in the weight file
  - This is one of the inputs of our fit
  - It is what specifies the weight for each data point we use
    - For the time being we simply use to switch data on and off (weight 1 or 0)
  - Yet the data in the file are presented in the order found in the histogram

## • Examples

```
# /global#19:32      0. # BNL_7FT,4      : 0. : 2. # BNL_7FT,4  
/global#32:44      0. # CCFR,2        : 0. : 2. # CCFR,2
```

- The first line is commented out so the weight of 0 is not assigned. Those points are used in the fit. It identifies the bins from 19 to 31 included
- The second line is used so those points are assigned a null weight in the fit, they are not used.
- The important things is that both have a key at the end BNL\_7FT,4 and CCFR,2
  - The key is based on our database which is not public
  - But you can get to a paper citation using the pdf file with the plots as the keys are there as well together with the citations

# Release plan

- Full support for reweight and hence full support for tune release is expected with v4
- We plan something to fill the gap
  - Each tune will have a Peer-reviewed paper
    - more precisely each new tuning procedure → More sustainable
  - Each set of tuning results will have a dedicated data release
    - corresponding to paper
    - re-runs or minor variations for which we may not write full new papers
      - there may be info on tech notes
  - The data releases will be citable and have a DOI number
- We can maintain a GENIE web page with list and links to all our data releases and the corresponding papers