



GENIE v3.02.00

GENIE User Forum - 21 Oct 2020
Marco Roda on behalf of the GENIE collaboration



Recap

- GENIE report
 - Change in the framework
 - New Models and tools
 - What is left out
 - Bug fixes
 - Timeline
 - Others infos
- As usual we follow with
 - Roundtable
 - AoB
- Useful links
 - genie website: <http://www.genie-mc.org/>
 - genie release webpage:



Framework

- Dependencies
 - C++ version support C++14
 - Dropped support for ROOT 5
- External interfaces
 - The GHEP interpretation changed
 - The particle X4() will have a valuable time
 - it will be in ys (10^{-24} s) from the interaction time
 - Before it was set to 0 always
 - The decay using PYTHIA is adapted so that the translation is updated properly
 - Before the daughters were in the same space time coordinate as the mother
 - The hadronic RES decayer is not changed
- Internal interfaces
 - simplify the implementation of cross-section models relying on tabulated hadron tensors
 - refactoring of the GENIE decayer and hadronization modules
 - Old cross section won't work anymore



Backward compatibility

- Cross sections
 - Because of the changes in the Algorithm names and structure
 - Event Record
 - The XclsProc is slightly different and does not have the same memory structure



New Models scheduled for v3.2

- Most of them presented already here
 - SuSAv2 for both 1p1h and 2p2h
 - INCL and Geant4 FSI
 - Pythia 8 hadronization
 - Correlated fermi gas
- But we also have
 - NLO DIS cross sections and support up to very high energy
- COH interactions
 - CEvNS
 - Dark neutrino COH scattering - BSM physics




New Tools

- Event Library Interface Generator
- new option (-T) in the GENIE atmospheric neutrino event generation app
 - to get the number of events corresponding to a lifetime (in sec)
- Automatically select flux surface radii when a detector geometry is specified in the GENIE atmospheric neutrino
- New options installed in GMCJDriver
 - always force an interaction of the input neutrino flux ray
 - use logarithmic binning in the histogram that records the maximum possible interaction probability
 - change the safety factor applied in the estimated maximum interaction probabilities



New tunes

- Dedicated CMC for INCL and GEANT 4 FSIs
 - labeled $G^{**}_{**c/d/i/j}$
 - And all the corresponding tunes for that
- New tunes
 - Final results from bare-nucleons cross section data
 - G18_[01a-d/02a-d]_02_11b
 - The old ones will be supported for v3.2, removed from next release
- new CMCs for high energy physics
 - based on NLO DIS cross sections
 - named GHE19_00a/b/c
- Experimental tune for SuSAv2
 - We want to encourage the usage of it we still have to analyze the models in details before deciding how to add it to a tune
 - Inputs from users in the future are extremely welcome



Sneak peek behind the curtains

- **Soon to be added**
 - NC COH Gamma
 - Minoon pion model (review to be had)
- **Active incubators**
 - Nuclear recoils for Correlated fermi gas
 - Saori Opi model
 - COH rho
 - Radiative decay
 - Contact formalism for nuclear fermi gas



Bug Fixes

- Added code to handle P33(1600) in the GENIE event generation modules
- Fixed a mistake in BaryonResonanceDecayer::IsHandled()
- Installed a fix in AGCharm2019 hadronization model
 - allowing the production of charmed-mesons above a previously existing cutoff value of 100 GeV
- Fixed a mistake in a Jacobean used in the Rosenbluth cross-section calculation
 - We made it wrong in 3.00.06 we changed our mind back
- Set of small reweight fixes
- Some safety checks in case you install the code in sensitive OS directories
- Variable binning for flux hists for T2K applications



Ideal timeline

- Only a few remaining pull requests
 - a. Correct space and time for PYTHIA decayer
 - b. Jacobian calling an exit
 - c. T2K app
 - d. Dark neutrinos
 - e. Event Library
- Ideally to be completed within a month



Publications

- The paper for the free nucleons cross section is about to be submitted to Journal
- Paper on hadronization about to be send to review to the GENIE collaboration