Cross Collaboration Working Group on Cross Section Communication

Daniel Cherdack University of Houston

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UNIVERSITY of HOUSTON

Outline

- Problems communicating cross sections
 - Problems related to production
 - Problems related to consumption
- Goals of the WG
- Procedures for accomplishing goals
- Working with and within NuSTEC

Problems Producing Cross Section Measurements

- Flux
- Background subtraction
- Nuclear effects
- Efficiency corrections →
- Detector effects
 - Unfolding
 - Forward folding

- Derived from signal model
 - How to assign errors?
 - Convolution with detect effects
 - Assumptions can vary
- Not defined where model does not predict
- Integration over hidden variables
- Binning dependent
- Phase space restrictions limit measurement scope

Problems with Consuming Cross Section Measurements

- Access to vital information
 - Efficiency functions
 - Covariance matrices \rightarrow
 - Uncertainty breakdowns
- Reproducing simulations
- Nuclear model differences
- True flux of model flux?
- Regularization effects
- Utilizing old data

- Are the available?
- What was marginalized out?
- Numerical precision
- Binning effects
- Sig/Bkg model consistency
- Different background model
- Different nuclear model
- Sig/Bkg correlations

Goals of the CCWG

- Prioritize and tackle the aforementioned issues
- Building communication pathways between experiments
 - Communicate new problems (and solutions) between collaborations on short time scales
 - Allow collaborations to offer each other advice and assistance
 - Help each other implement models, data releases and combined fits
- Develop community-wide standards and tools
 - Analysis guidance and best-practices
 - Lexicon for common used (and misused) terminology
 - Standardized statistical methods and fitting tools
- Improve data utility and longevity
 - Identify key components of data releases
 - Develop standardized data release format
 - Work with collaborations to build data release "readers"

Charges in the Proposal

- Establish lines of communication between experiments on a timescale much less than the international conference schedule (e.g. NuInt),
- Agree on definitions for commonly used terminology, correct implementations of commonly used techniques, and proper applications of statistical methods,
- Provide a platform to discuss new and interesting techniques in cross section analyses,
- Agree upon the structure and contents of a universal data release format for cross sections, and recruit members of the community to develop tools for producing, housing, accessing and interpreting data produced in this format,
- Work with generator (and related tool) developers to create common tools for model/generator tuning based on cross section data, and
- Work with the cross section community as a whole to establish solutions to major challenges in producing cross section measurements as highlighted in, but not limited to, Appendix 1.

Working Group Structure

- Representatives from various groups
 - Cross section producing experiments
 - The generator community
 - Other cross section tools (e.g. NUISANCE)
- Regular Meetings (bimonthly?)
 - Identify topic
 - Representatives invite relevant audience
 - Invite an expert speaker
 - In-depth and detailed discussion amongst experts and active analyzers
- Follow-up
 - Did the discussion point toward any follow-up tasks? If yes ...
 - Identify small interested / motivated group based on discussion
 - Formalize tasks and timeline
 - Report back, think about papers, etc

CCWG and NuSTEC

- NuSTEC has existing infrastructure
 - Agreements with collaborations
 - Representatives from major groups
 - Connections with the theory community
 - DOE and FNAL support
 - Email list and website
- CCWG can help NuSTEC to:
 - Identify important topics to pursue (NuSTEC projects?)
 - Engage the greater cross section community
 - Develop tools to help theorist make better use of data
 - Push the community toward a more viable path for developing the cross section models needed for the next generation of neutrino oscillation experiments

Open Questions

- How does the CCWG fit into the NuSTEC "org chart"?
- Do active CCWG members have to be NuSTEC board members?
- Should the CCWG have a "nustec-xxx" email list?
- Does NuSTEC have computing resources (web server, storage, fnal gpvms) that the CCWG can use?
- I am sure there are more issues ...