Hadronic Group
Work Plan for 2014

2nd version, 27 February 2014
Model development (1)

STRING MODELS

- Preparation of a short description of FTF model for publication
  - V. Uzhinsky (1)
- Improvement of diffraction dissociation in FTF model
  - V. Uzhinsky (1)
- Validation of FTF for nucleus-nucleus interactions
  - A. Galoyan, V. Uzhinsky (1)
- Validation and extension of HIJING through the G4 interface
  - Validation with high-energy p-A and A-A data
  - Supplement HIJING with Bertini or Binary cascade
  - Supplement HIJING with de-excitation codes
  - K. Abdel-Wagel (1 & 2)
Model development (2)

- Code improvement of FTF
  - A. Ribon (with advices and help by Gunter) (1 & 2)
- Study of rescattering in FTF with Bertini and Binary
  - A. Ribon (2)
- Tuning of FTF model to improve of proton spectra in proton-Nucleus and antiproton-Nucleus interactions
  - A. Galoyan (2)

- Validation and improvements of QGS
  - Extension to lower energy with Reggeon Cascade
    - V. Uzhinksy (2, if supported by SFT)
  - Study and validation of diffraction dissociation
    - V. Grichine (1) & V. Uzhinksy (2, if supported by SFT)
Model development (3)

BERTINI MODEL

- New two-body angular distributions for pi-N
  - D. Wright (1)

- Bertini parameter tuning
  - Re-evaluate overall performance (both thin and thick target) with in-medium cross-sections, improved angular distributions, and physically-motivated nuclear model parameters
  - M. Kelsey (1)

- Validate final-state nucleon clustering for light-ion production, and enable by default
  - M. Kelsey (1)

- Update and improvement of kaon physics in Bertini
  - Extend final-state tables to 32 GeV and 9-body final states
  - D. Wright (2)
Model development (4)

PRECO MODEL

- Improve design of de-excitation module to reduce memory footprint, reduce memory churn, and improve CPU
  - V. Ivanchenko (2)
HP MODEL

- Improve MT-behaviour of neutronHP
  - T. Koi (1)
- Merge neutronHP with particleHP
  - T. Koi (1) with the help of CIEMAT group
- Continue the development of the Fission Fragment Generator model in neutronHP
  - B. Wendt (1 & 2)
- Add interpolation of cross sections following ENDF-6
  - P. Arce (1)
- Test particleHP for a big number of isotopes and energies
  - P. Arce (1)
Model development (6)

- Validation of new neutron cross section libraries (i.e. new releases) and new G4 releases (i.e. version 10)
- Verification that the neutron transport in neutronHP remains the same after the merging with particleHP
- Revision of the thermal transport energy processes and libraries
- Act as an interface between the Nuclear Physics community and the Geant4 collaboration (via the EC projects ENSAR, ENSAR2 and CHANDA)
- D. Cano & E. Mendoza (1 & 2)
Model development (7)

BINARY MODEL

- Add coalescence to BIC
  - G. Folger (2)
- Improve use of static TLS in the scatterer (*im_r_matrix*)
  - G. Folger (1)
- Investigate BIC for pi- stopping at rest and gamma-nuclear
  - W. Pokorski (2)
Model development (8)

**INCL++ MODEL**

- **Automatic physics testing of INCL++**
  - D. Mancusi (1)
- **High-energy extension of INCL++ (up to 12 GeV)**
  - D. Mancusi (1 & 2)
Model development (9)

RADIOACTIVE_DECAY

• Fix reproducibility problems in radioactive decay (1)
• Improve and refactor radioactive decay code (2)
• Validation tests for radioactive decay (2)
• D. Wright
Model development (10)

ELASTIC MODEL

• Development (and validation) of hadron elastic scattering
  • V. Grichine (1)

• Validation of hadronic models for elastic scattering of:
  • Pi-proton, Pi-Nucleus, K-proton, K-Nucleus, antiproton-proton, antiproton-Nucleus
  • A. Galoyan (1)
Model development (11)

OTHER MODELS

- Evaluate and eventually implement the charge-exchange process
  - V. Ivanchenko (2)

- Code improvement of Chips-extracted quasi-elastic
  - W. Pokorski (2)
Cross Sections

- Design and code improvements of hadronic cross sections
  - W. Pokorski (1)
- Complete test suite for hadronic cross sections (with data)
  - W. Pokorski (1)
- Validation of hadron elastic cross sections (and final-state)
  - V. Grichine (1)
Code/Design Review

- **Review of the memory use in hadronic classes**
  - Reduce memory footprint and churn
  - A. Dotti et al (1 & 2)

- **Design improvement of hadronics**
  - e.g. de-excitation model;
    - using factories for hadronic models; etc...
  - The review of hadronic classes needed for G4 MT offers a good opportunity for design & code improvements in hadronics
  - Many people (1 & 2)
Validation & Testing (1)

- Update and improvements of hadronic tests and examples
  - A. Ivanchenko, M. Maire (1 & 2)
- Validation of proton elastic scattering
  - V. Grichine (1)
- Validation of neutronXS with TARC
  - A. Howard (2)
Validation & Testing (2)

- Validation framework development (1 & 2)
- Muon stopping and capture development and validation, Test48 (1 & 2)
- Maintenance, and periodic execution of Test19, Test47, Test48, Test75 (1 & 2)
- Development of Test23 (1 & 2)
- Physics highlights release page (1 & 2)
- FNAL Team: D. Elvira, K. Genser, H. Wenzel, J. Yarba