Summary of Parallel Session 5A (Low Energy Hadronic)

Geant4 Collaboration Meeting
29 September 2017

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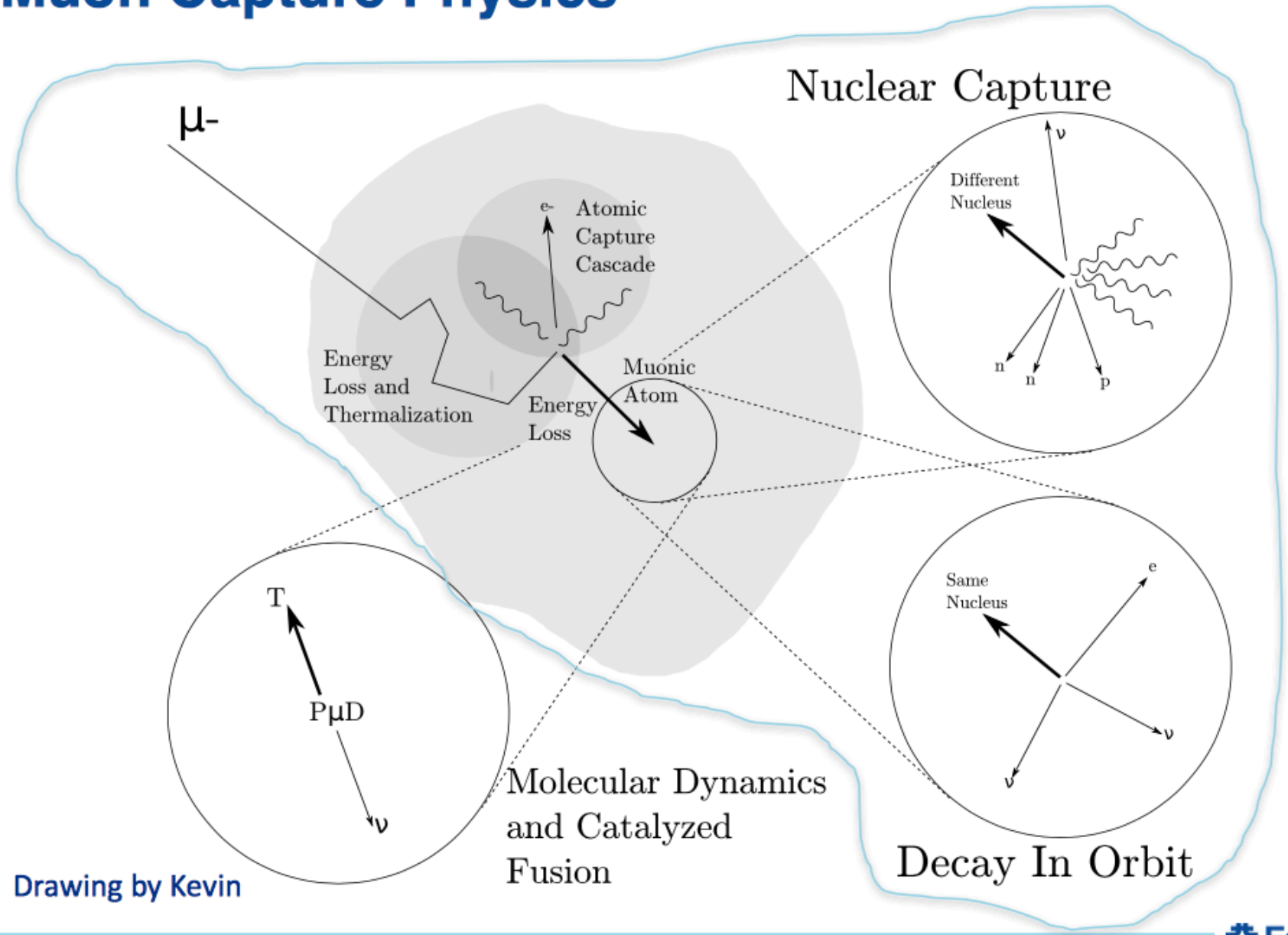
Muon Capture Physics



Drawing by Kevin

Muonic Atoms (K. Genser)

- Introduced new class G4MuonicAtom
  - add G4GenericMuonicAtom
  - together with G4MuonicAtomHelper which
    - creates G4MuonAtom
    - provides auxiliary functions

- G4GenericMuonicAtom and G4MuonicAtom modeled after G4GenericIon and G4Ion
  - generic ones are assigned to initial process, then are specialized as “trackable” instances (given Z and A) on demand

Muonic Atoms

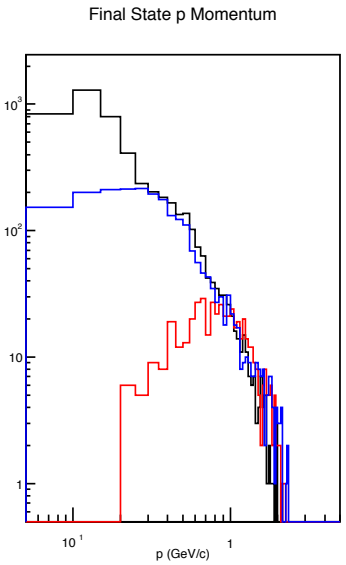
- In the same way as G4HadronStoppingProcess acts on G4MuonMinus
  - design G4MuonicMinusAtomicCapture to act on G4MuonMinus
  - also G4MuonicAtomDecay acting on G4MuonAtom

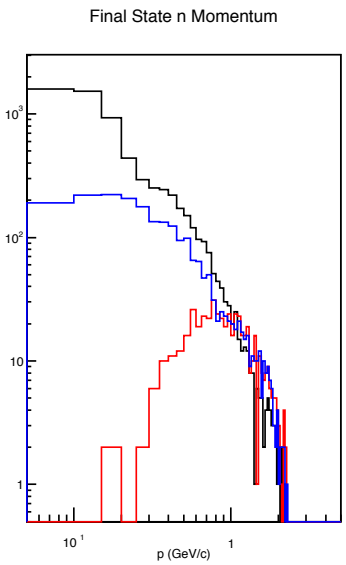
Neutrino Scattering (D. Wright)

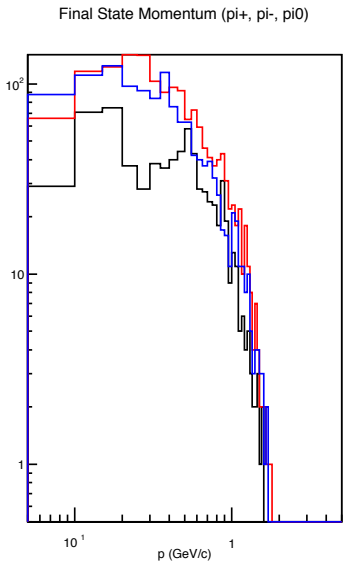
- Geant4 to GENIE interface complete
  - GENIE can now use Geant4 for nuclear final state interactions which follow initial neutrino interaction

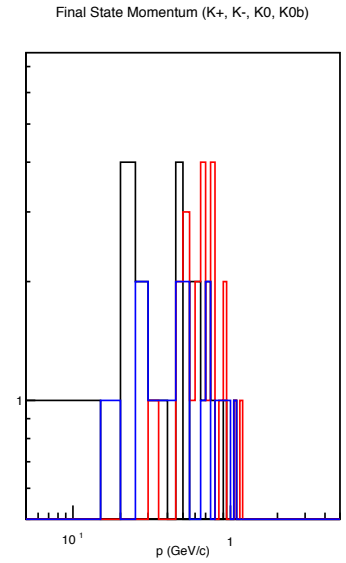
- Now start on GENIE to Geant4
  - use GENIE neutrino interactions as Geant4 processes/models
  - need several Geant4 neutrino classes (some cross section classes already written (V. Grichine)
  - need wrapper classes to make GENIE classes look like Geant4 classes
  - will need to use Geant4 biasing to allow conventional Geant4 tracking

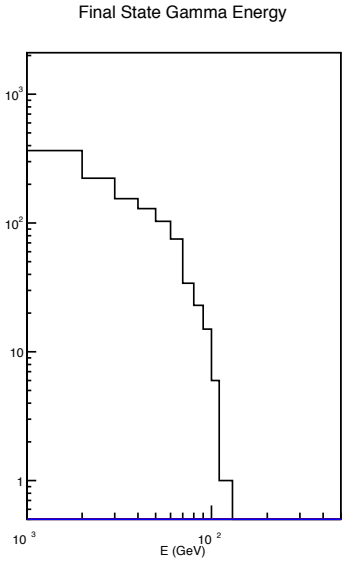
Neutrino Scattering: DIS (black: Bertini, Blue: GENIE)

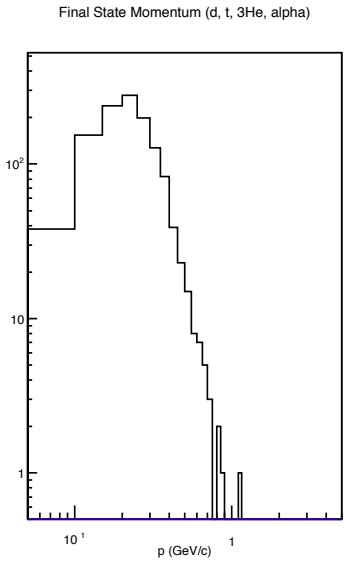












Radioactive Decay (D. Wright)

- Progress since last year
  - RDM split into two processes: biased and unbiased
  - original kept for backward compatibility
  - correlated gamma emission used by RDM (but CPU and reproducibility problems exist
  - reduced memory churn by instantiating G4PhotonEvaporation only once
  - unified DB formats and notation

- Projects underway (identified at RDM mini-workshop)
  - validation of correlated gamma code
  - beta-delayed particle emission to continuum
  - consistent treatment of floating levels

Radioactive Decay

- What's next (identified at RDM mini-workshop)
  - better atomic deexcitation model in order to improve energy conservation (contact T. Kibedi)
  - martrix method for Bateman equations to reduce precision problems (identical decay rates)
  - example for correlated gammas (^{60}Co)