Muon Yield Comparisons for Different ICOOL Versions and Lattices

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Simulation

- Run MARS15 with target & beam configuration settings from optimization study. (MARS events of 10^6 for 2, 3, 4 GeV, $4*10^5$ for 5, 6, 7, 8 GeV, 10^5 events for 9, 10, 11,12, 13, 14 GeV; target parameters of 11 and 13GeV from interpolation)

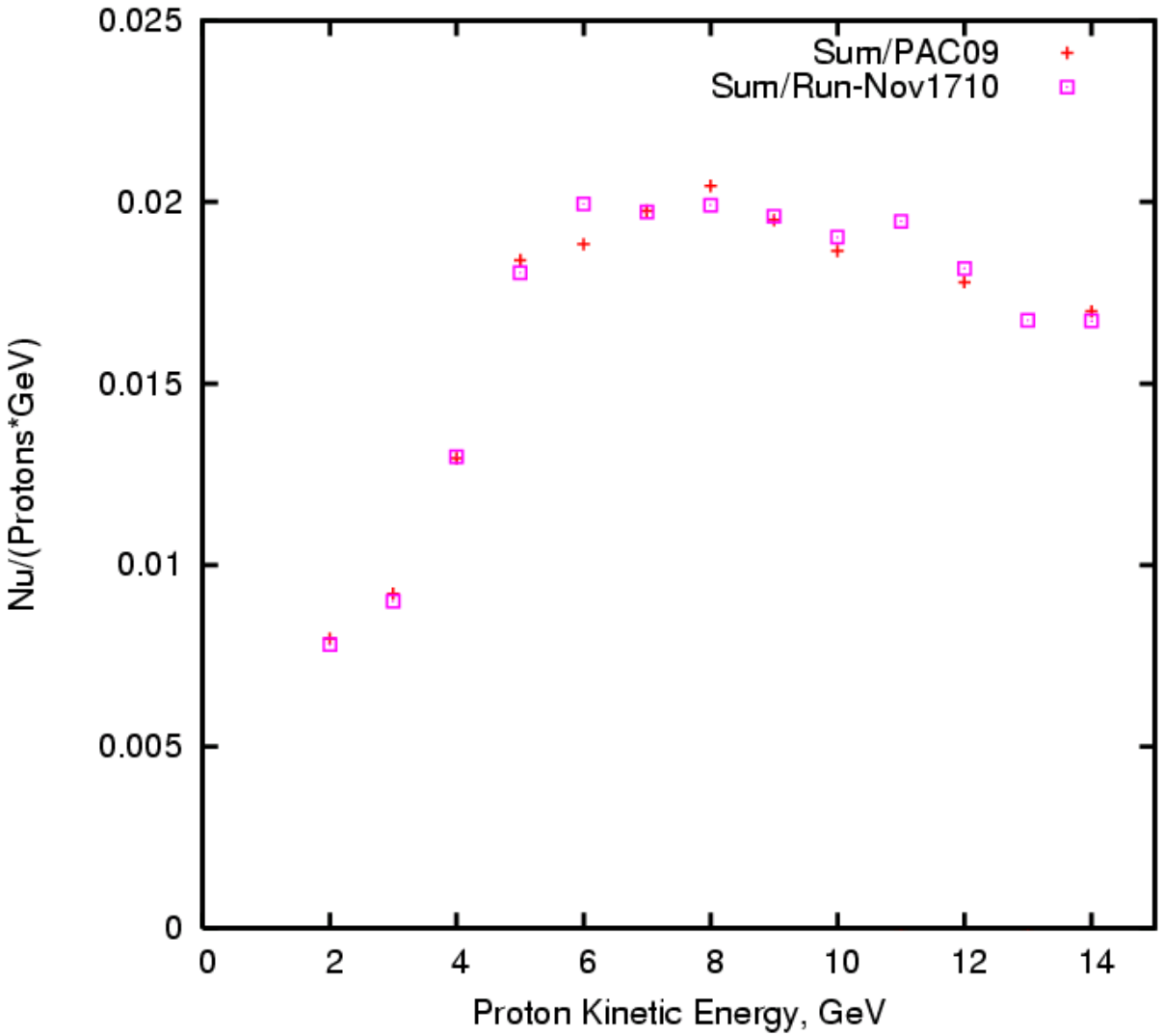
- Take the muon/pion/kaons at z=0 m from MARS output (Field & solenoid position of ST2a configuration) to generate the for003.dat without smear of the particle time.

- Particles are tracked until the end of the cooling channel with different ICOOL decks (ST2a-BNL/ST2a-ISS/IDR) and different ICOOL versions (v310/v316/v320).

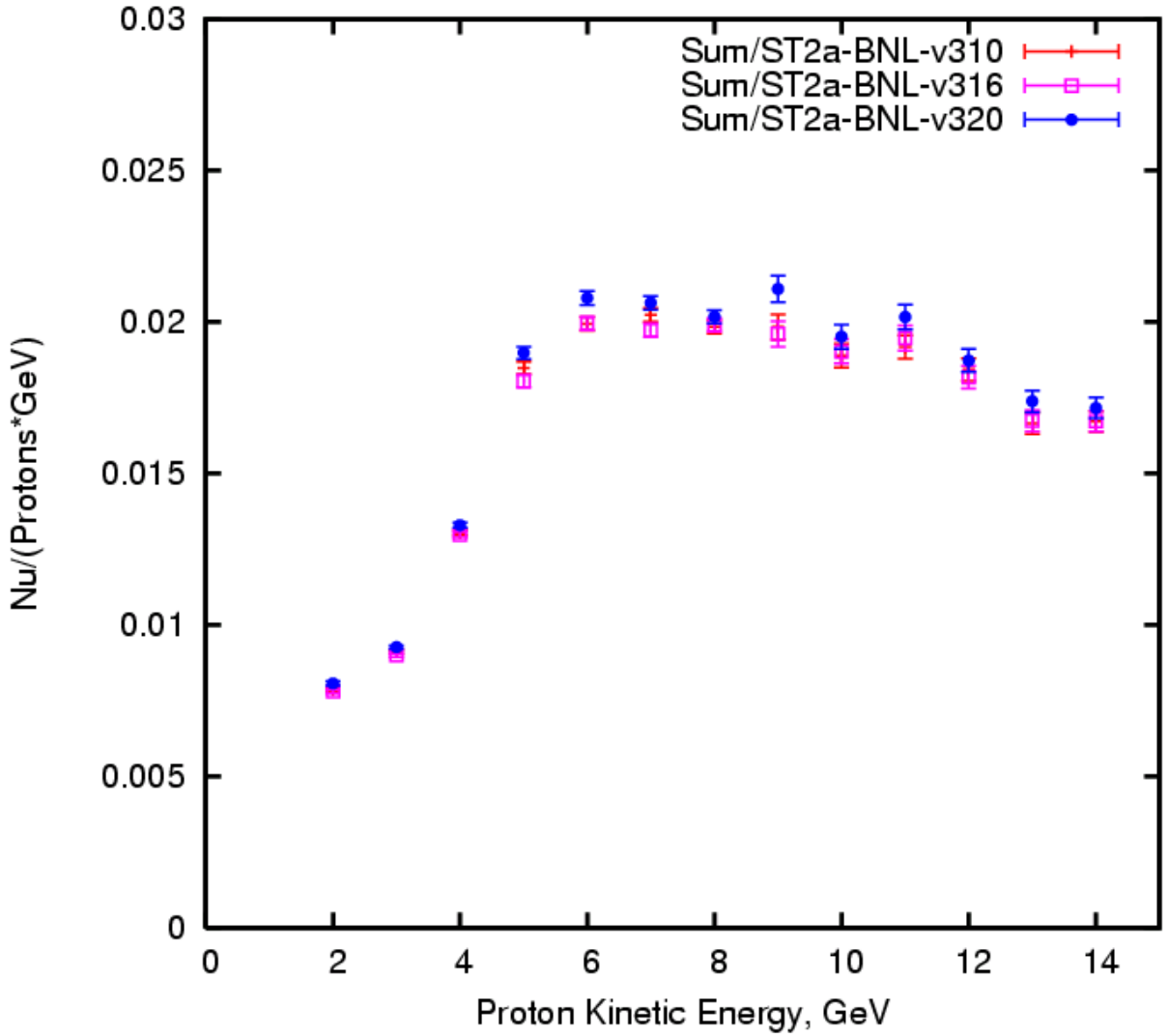
- Acceptance cuts (using ecalc9f):

100 < pz < 300 MeV/c, no tail cut (sigma_cut = 0)
A// = 150 mm, no pz-A⊥ correlation (pzcorr = 0)
A⊥ = 30 mm

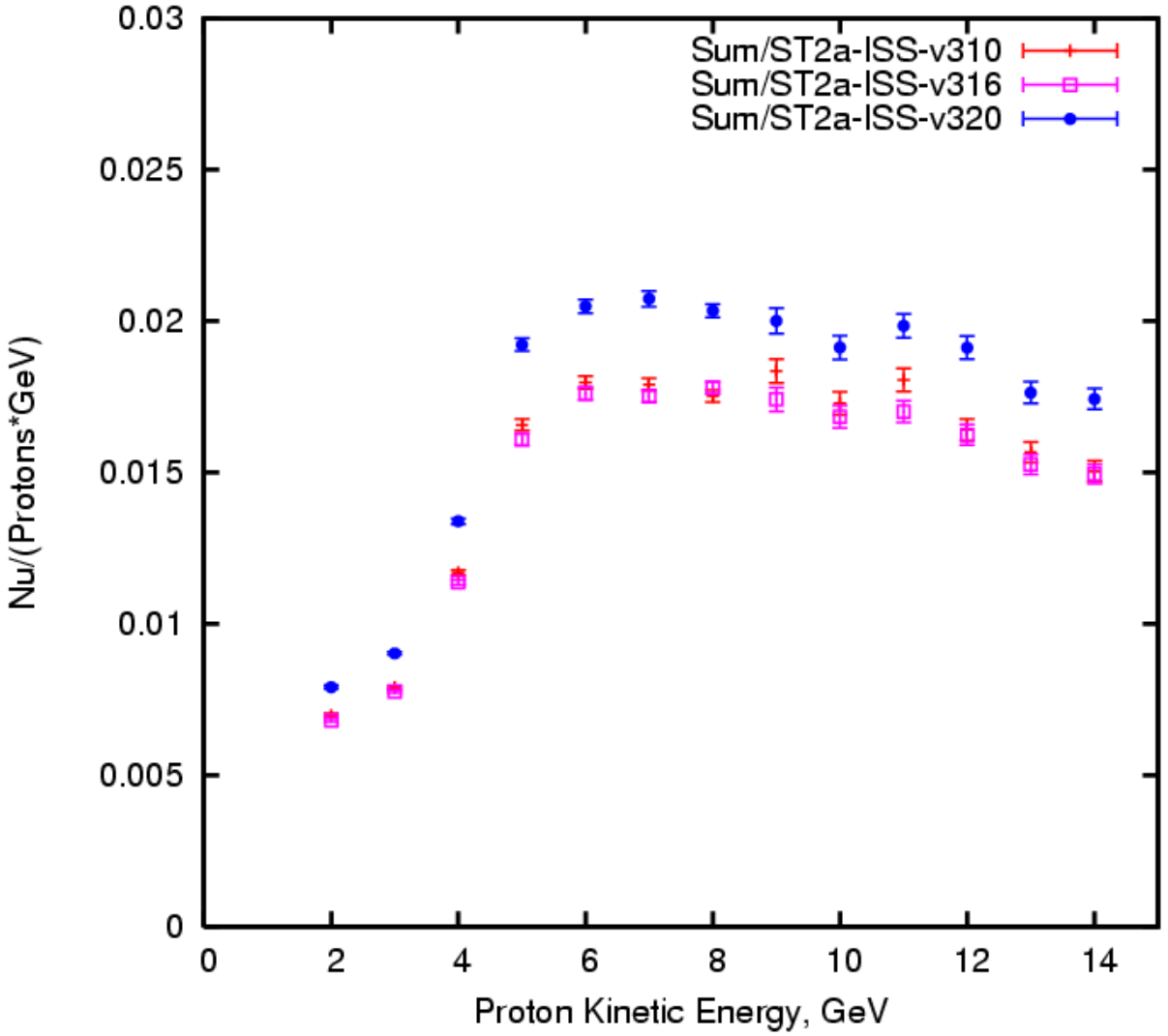
Consistency of Running MARS



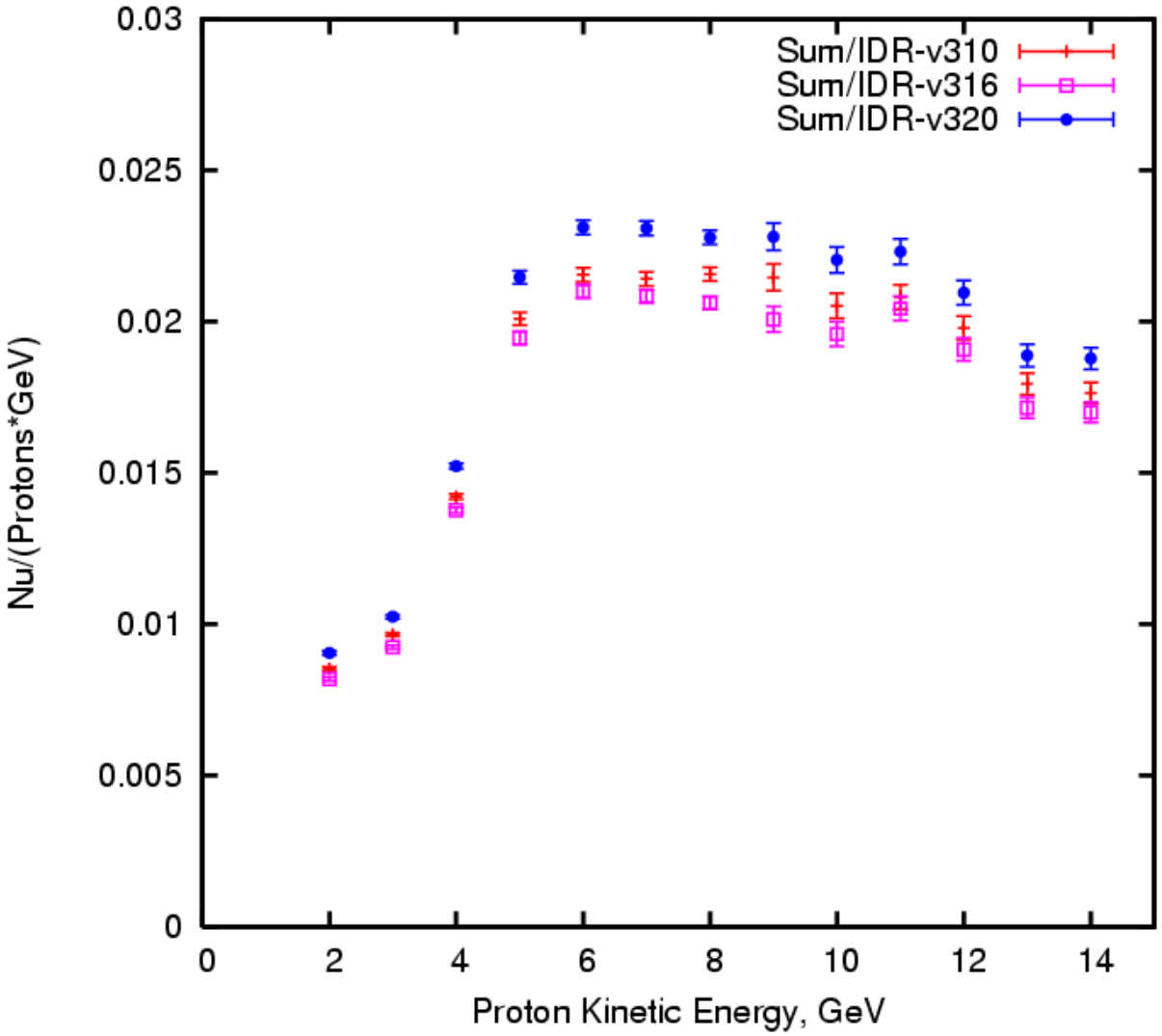
Muon Yield from Different Versions of ICOOL with ST2a-BNL Input Deck



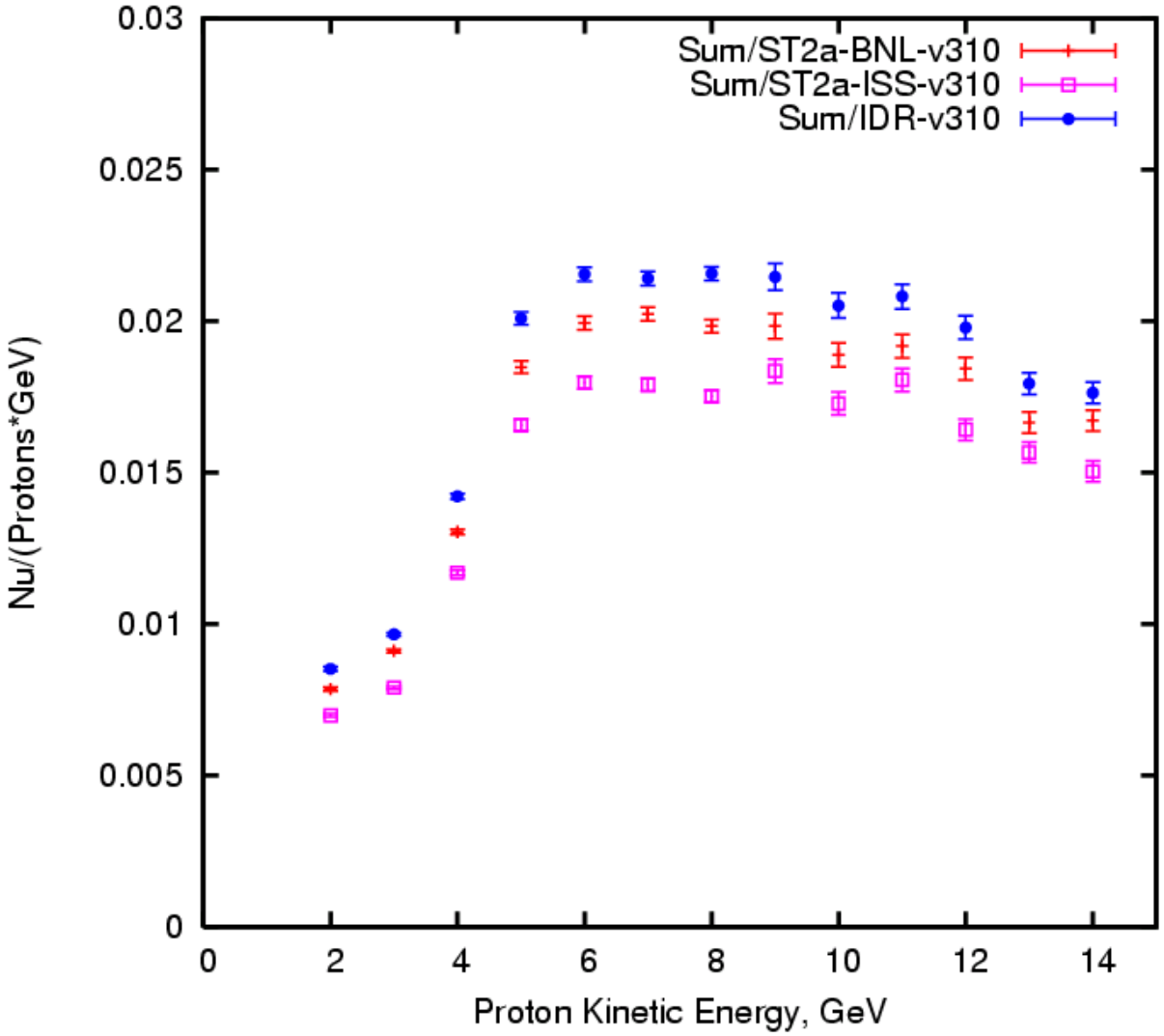
Muon Yield from Different Versions of ICOOL with ST2a-ISS Input Deck



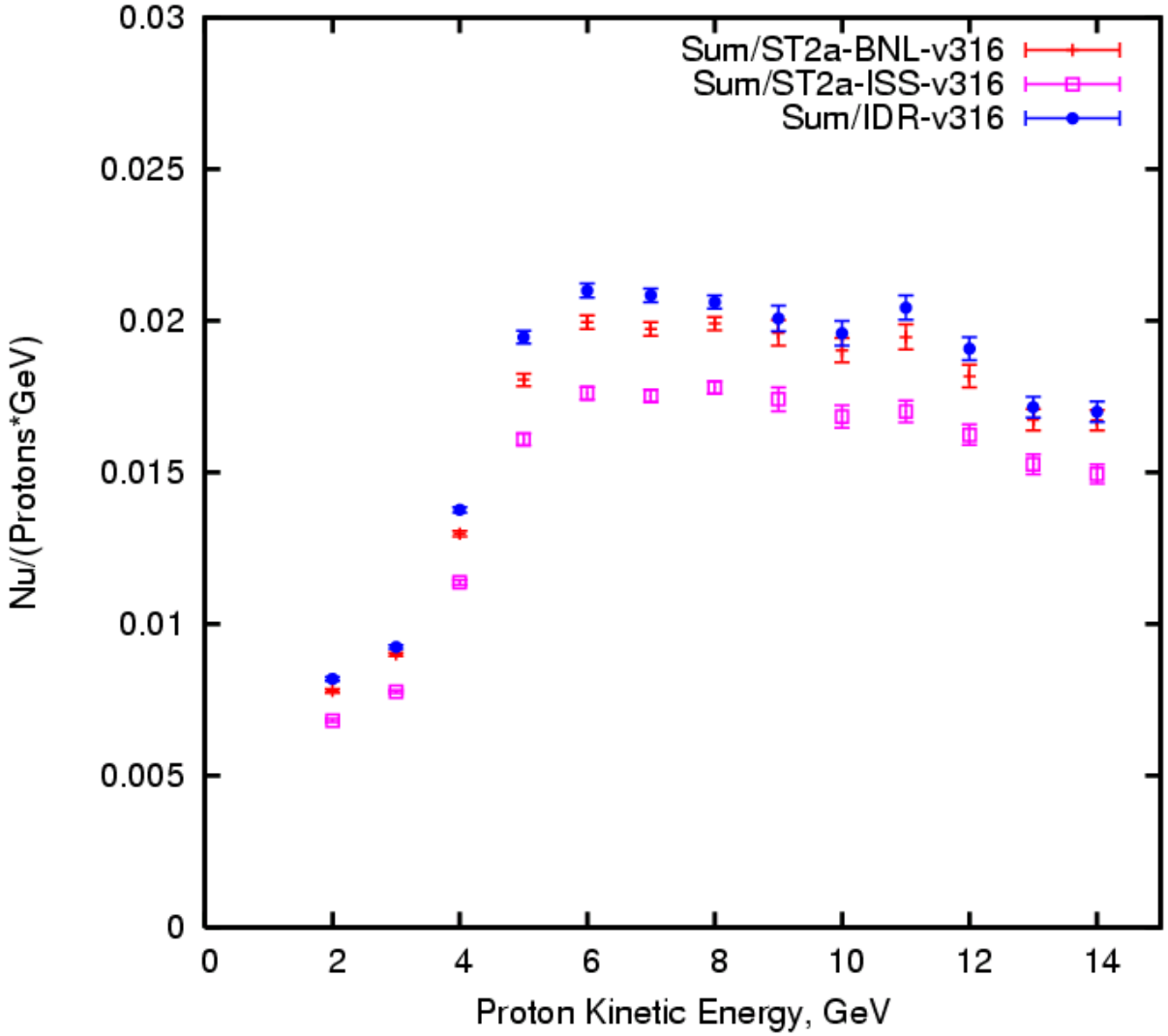
Muon Yield from Different Versions of ICOOL with IDR Input Deck



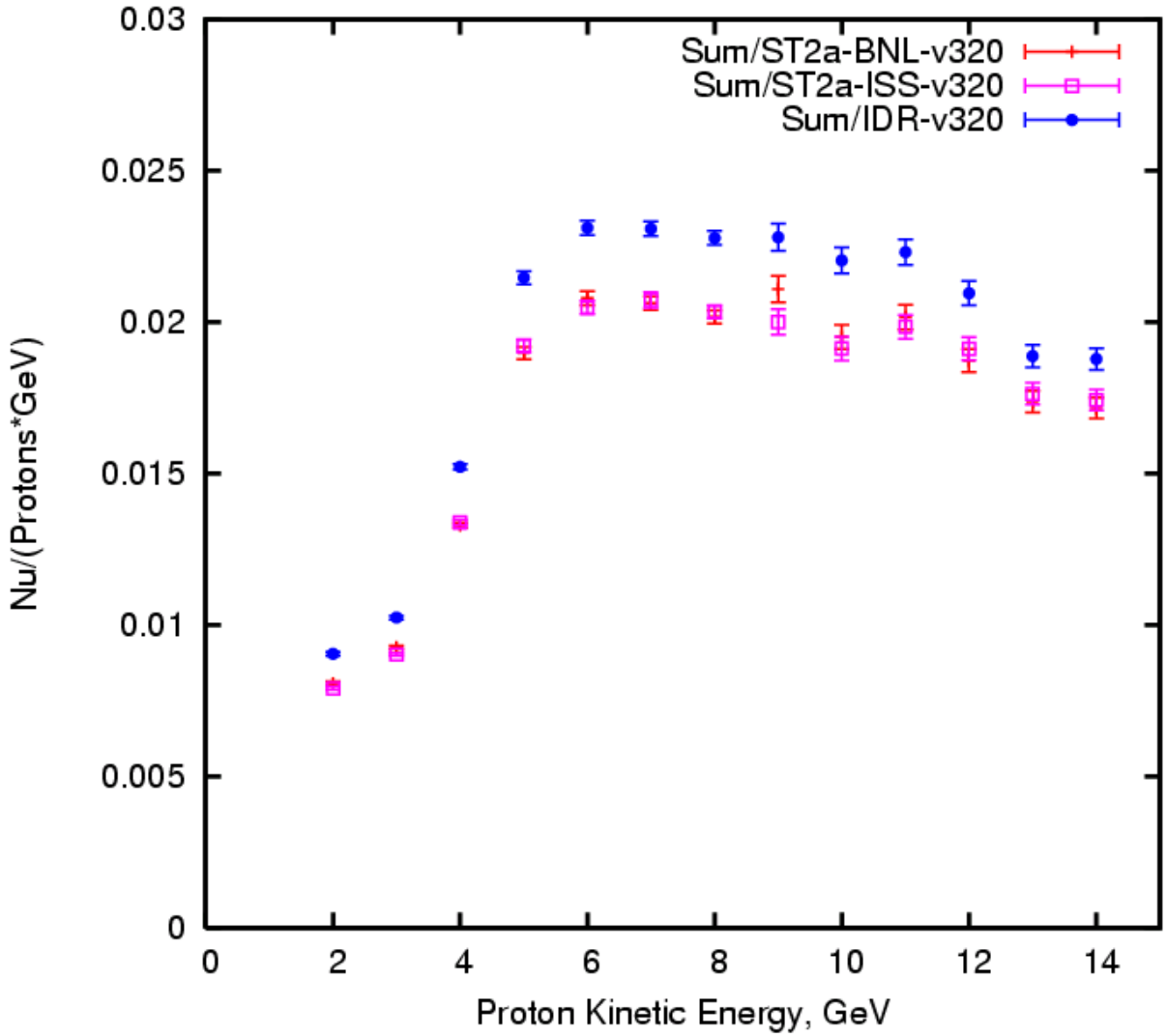
Muon Yield from Different Input Decks with ICOOL v310



Muon Yield from Different Input Decks with ICOOL v316



Muon Yield from Different Input Decks with ICOOL v320



Summary

- ST2a-BNL input deck gives almost same muon yields at any proton KE no matter which version of ICOOL is used.
- ST2a-ISS input deck gives less muon yield than ST2a-BNL input deck at ICOOL v310 or ICOOL v316. They only have similar muon yield at ICOOL v320.
- IDR input deck gives higher muon yield than ST2a-BNL and ST2a-ISS input deck at any proton KE no matter which version of ICOOL is used.