UNIVERSITY OF SUSSEX

DEEP UNDERGROUND NEUTRINO EXPERIMENT

Simulating neutrino beam

Using external data to improve the neutrino beam simulation at the NOvA and DUNE experiments

Using one experiment to make experimenting on two other experiments better - Sorry!

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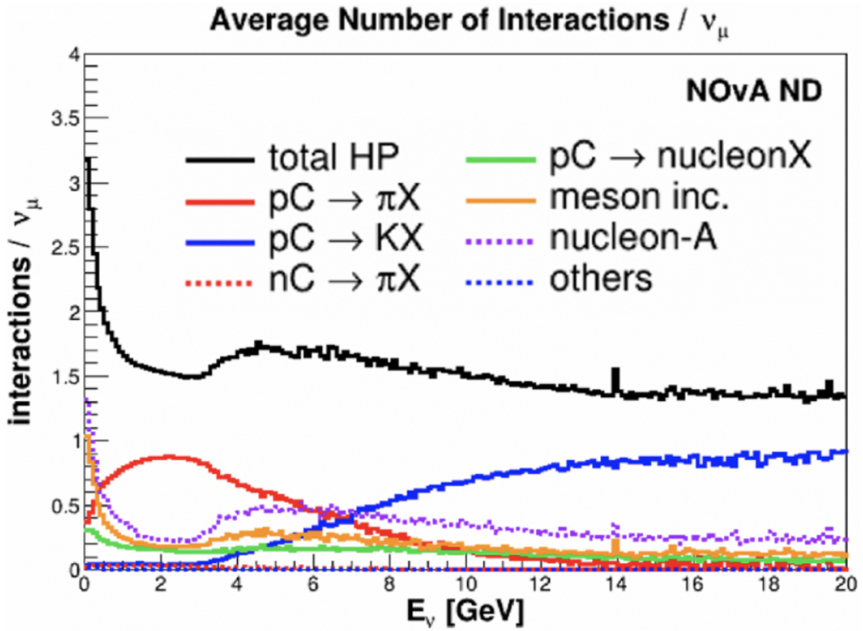
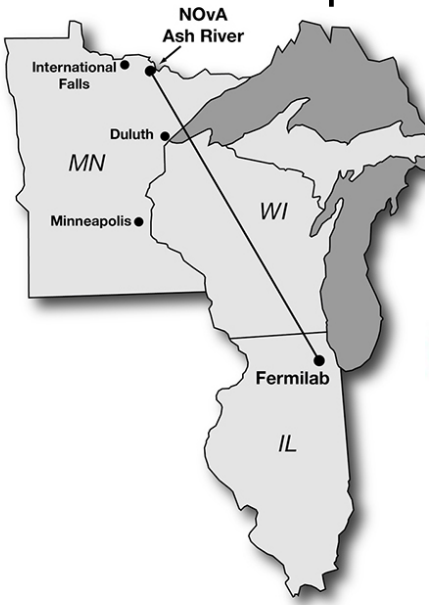
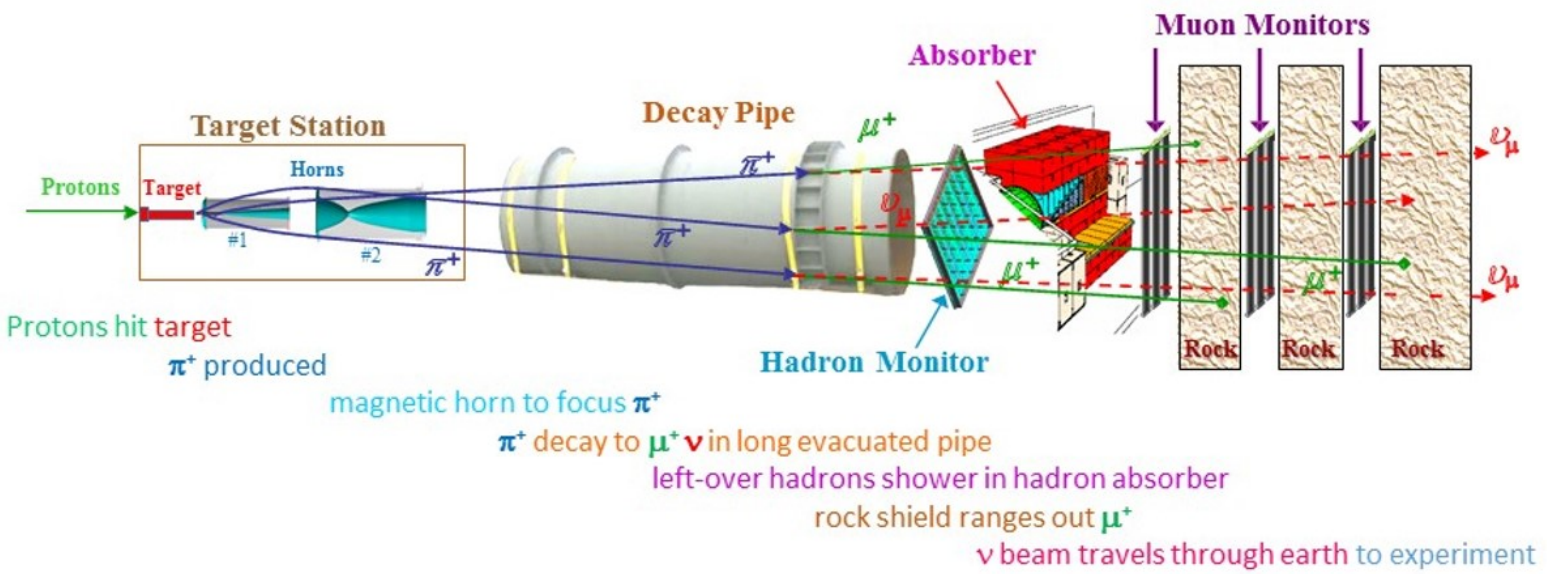
June 29, 2021

NOνA

- NOνA is a long baseline, two detector neutrino experiment
- Uses the most powerful artificial neutrino beam in the world
- Neutrino properties too complicated to be drawn directly from data
- Needs simulation as close to the real world as possible

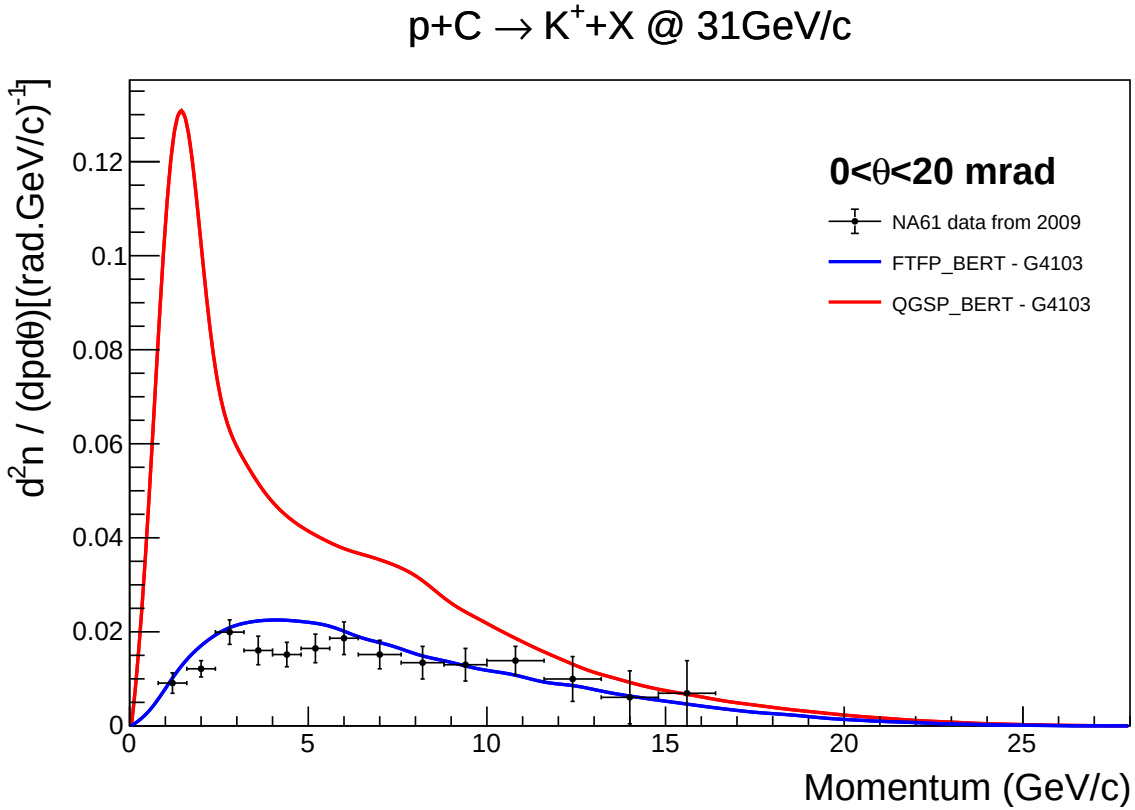






Correcting the simulation

- NOνA and DUNE use the *Geant4* Monte Carlo simulation (different *physics lists*)
- Low energy interactions described by the *Bertini internuclear cascade (BERT)*
- Different string models for high energy interactions
  - quark gluon string model (QGSP) - DUNE
  - FRITIOF string excitation and fragmentation model (FTFP) - NOνA
- Experiments NA49 and MIPP currently used
- New data from NA61/SHINE experiment



Thank you for your attention!