



¹GSI Helmholtzzentrum für Schwerionenforschung, Planckstr. 1, 64291 Darmstadt, Germany

²Frankfurt Institute for Advanced Studies, Ruth-Moufang-Strasse 1, 60438 Frankfurt am Main, Germany

³Institute for Theoretical Physics, Goethe University, Max-von-Laue-Strasse 1, 60438 Frankfurt am Main, Germany

mohs@fias.uni-frankfurt.de

J. Mohs, S. Ryu, H. Elfner arXiv:1909.05586 [nucl-th]

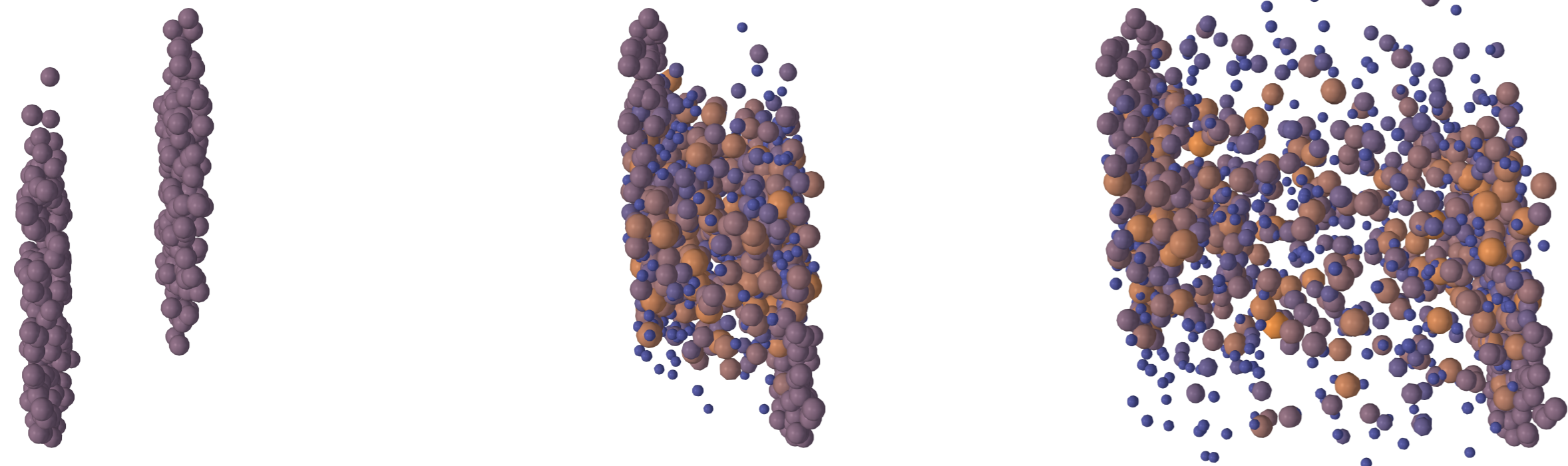


Motivation

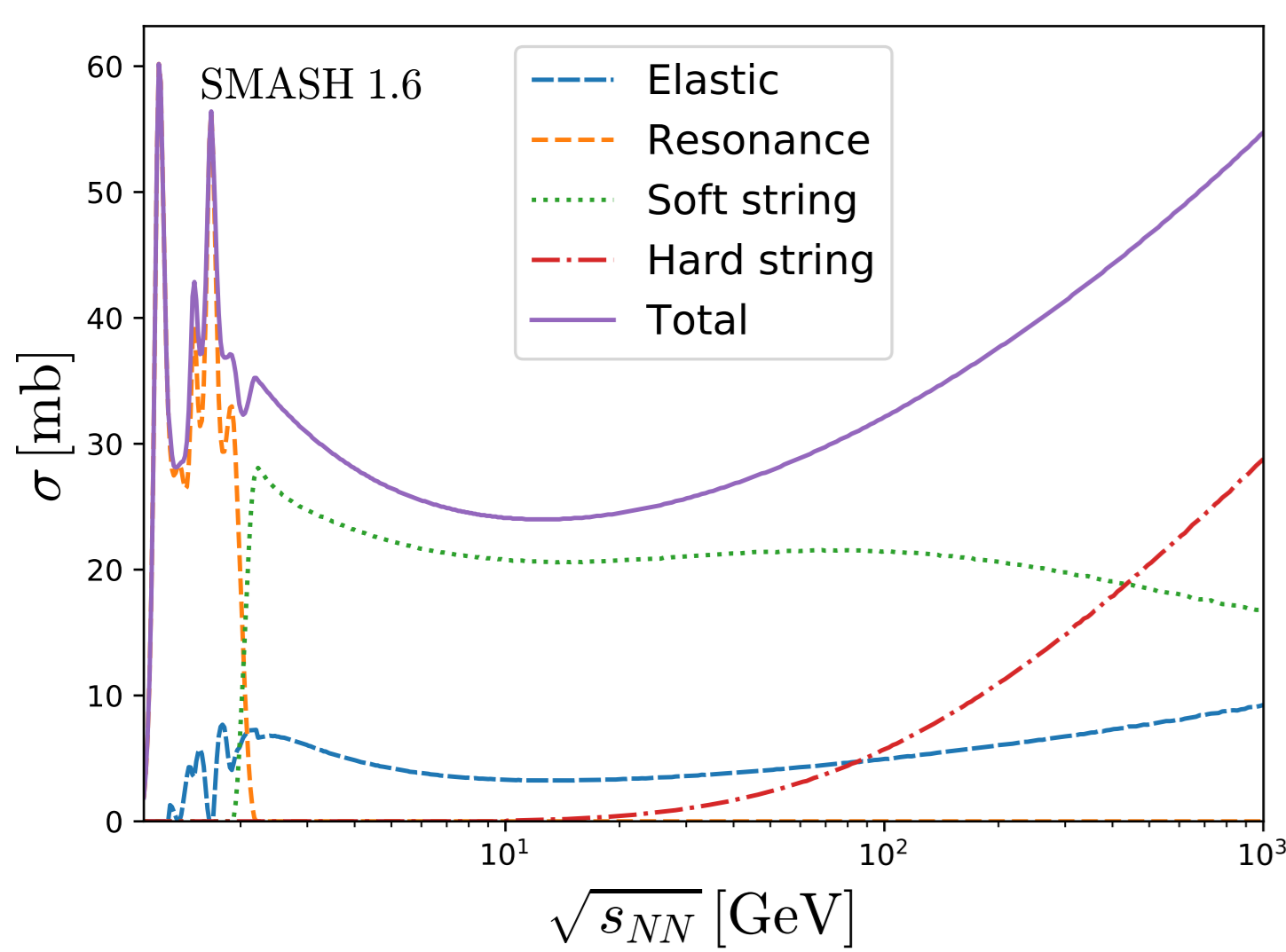
- Beam Energy Scan is currently ongoing
- Need to understand the stopping of baryons quantitatively

Model: SMASH

- Hadronic transport approach with geometric collision criterion
- More established hadrons from the Particle Data Group with a mass of up to ≈ 2 GeV are included
- Non-equilibrium dynamics are described by effectively solving the relativistic Boltzmann equation



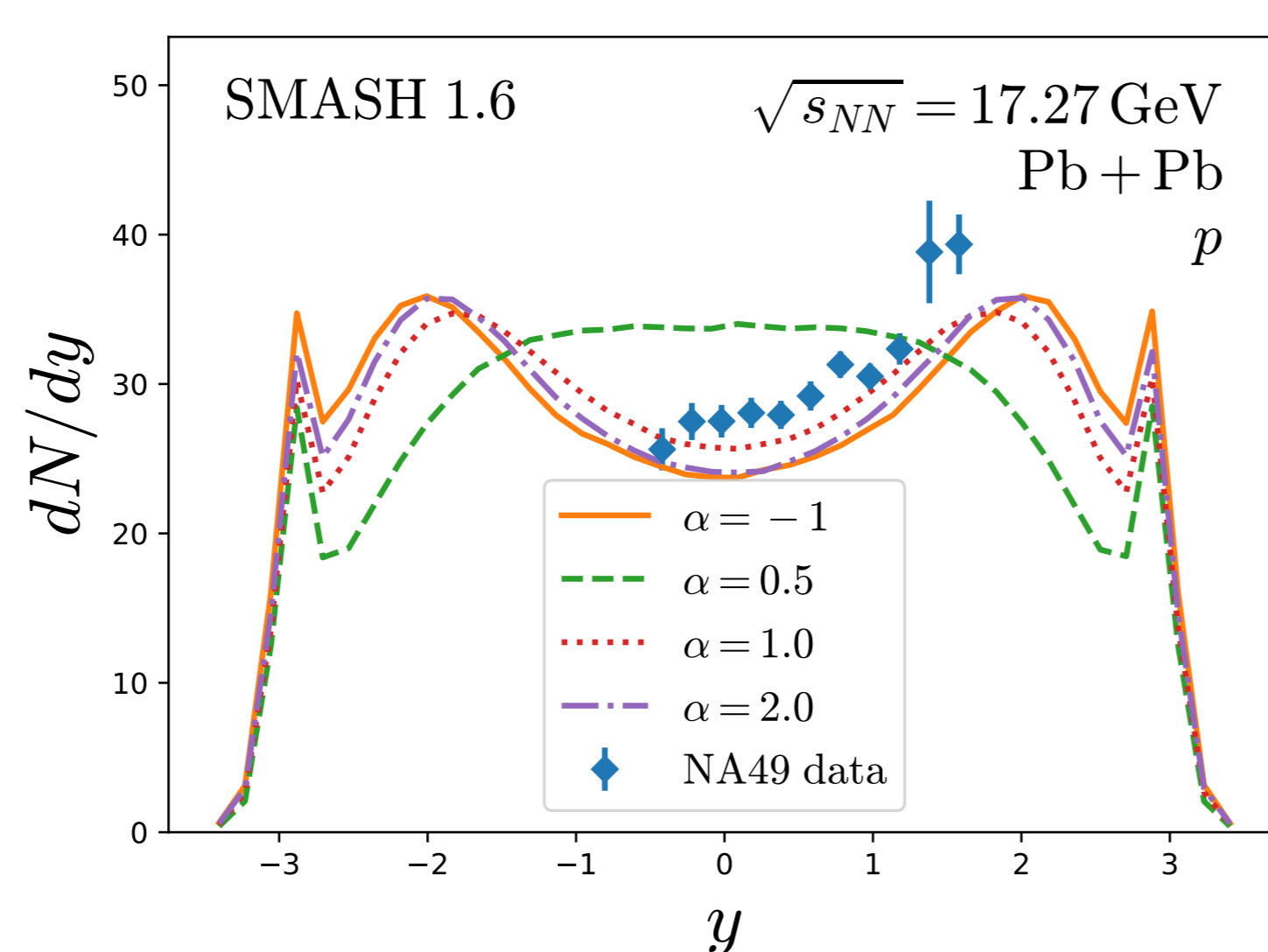
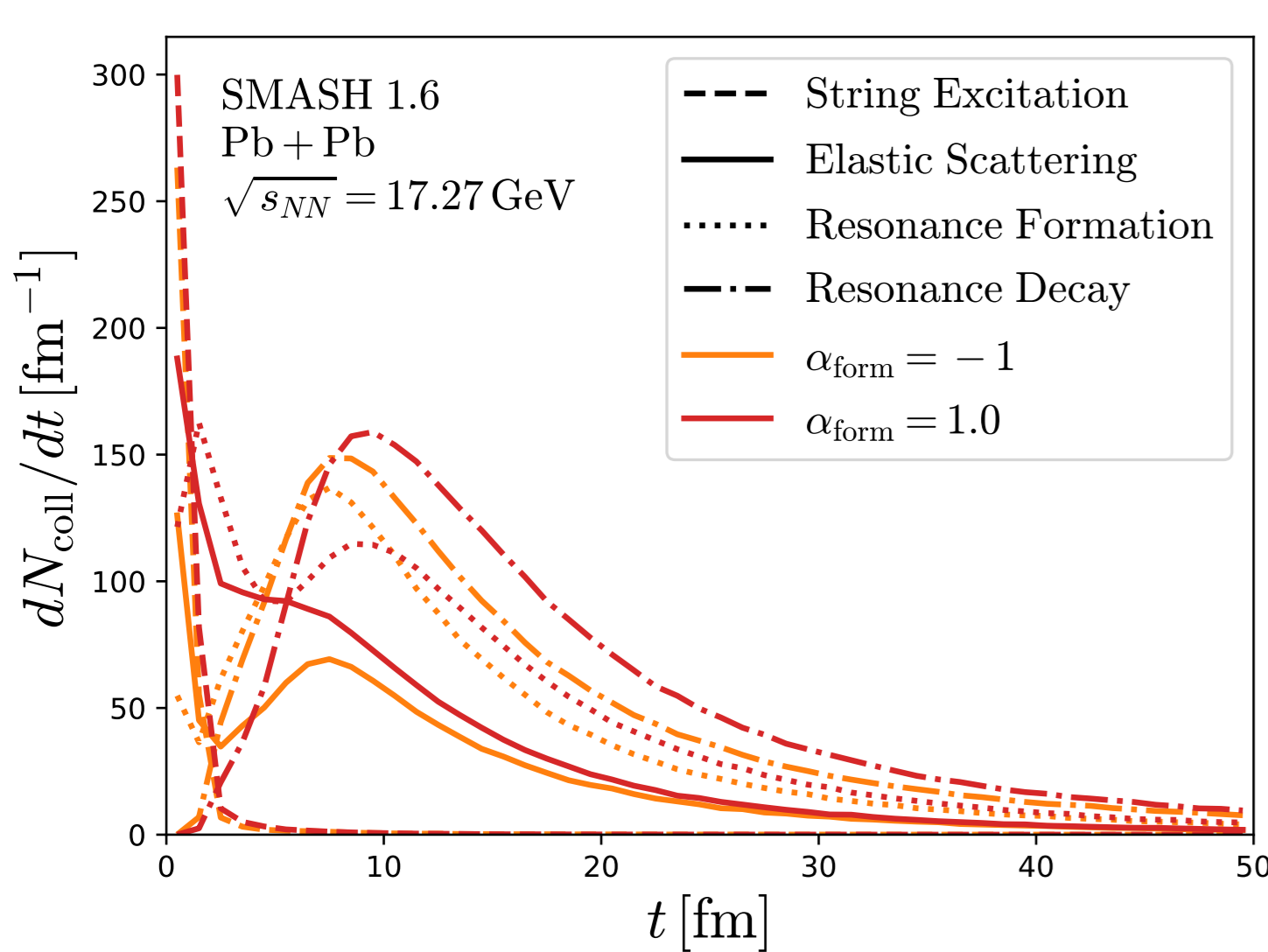
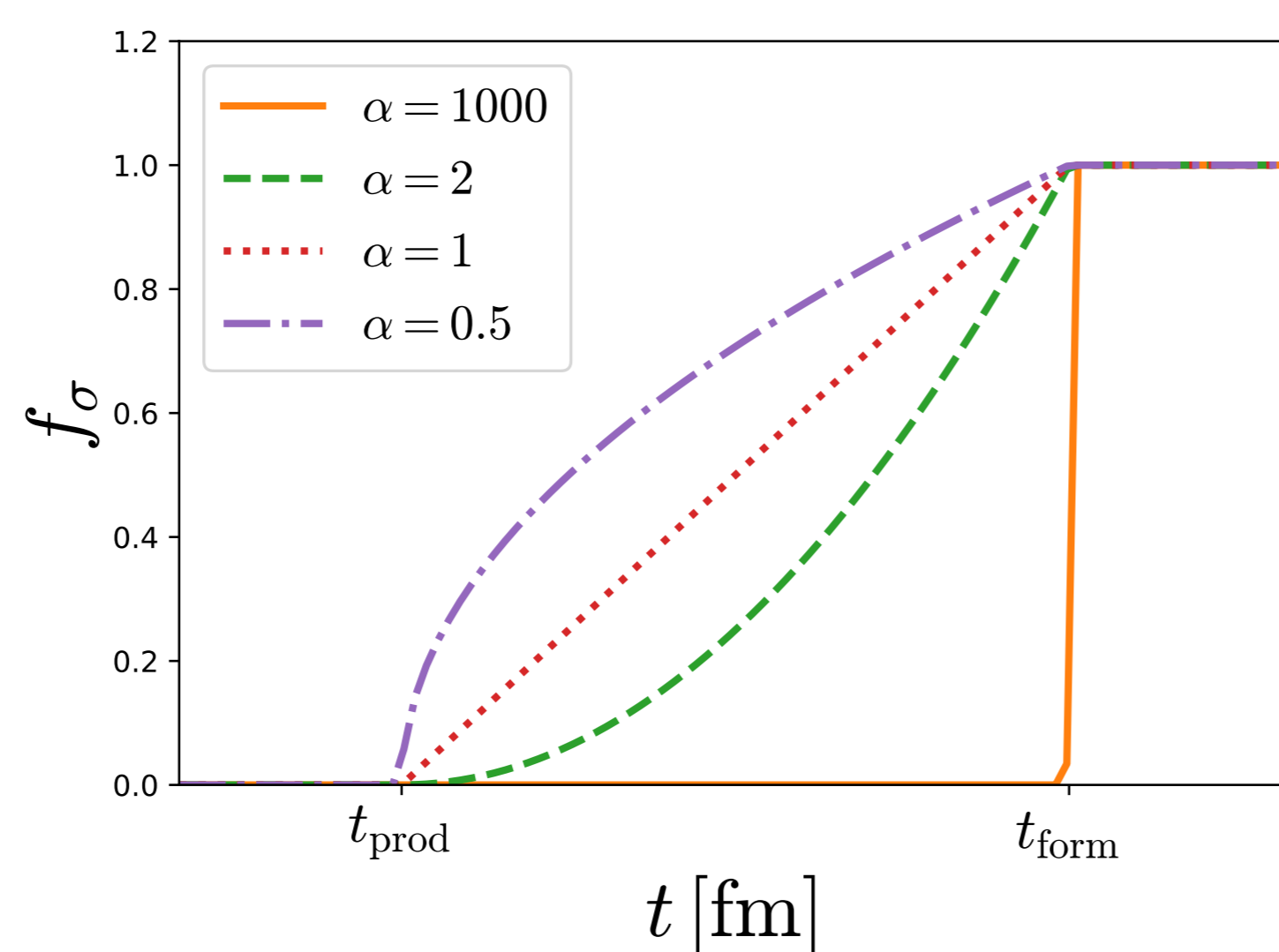
Pb-Pb collision at $\sqrt{s_{NN}} = 17.27$ GeV



- Inelastic cross sections via resonance formation and decays at low energies
- Model for string excitation at intermediate energies is introduced and Pythia is used for the fragmentation
- Pythia is directly employed at high energies
- Code and analysis suite publicly available at <https://smash-transport.github.io>

Particle Formation

- Continuous formation of particles is mimicked by reducing the cross sections by a factor f_σ
- Cross section scaling factor increases with time between string excitation and the formation time of the particle
- Linearly increasing the cross sections with time is supported by the data

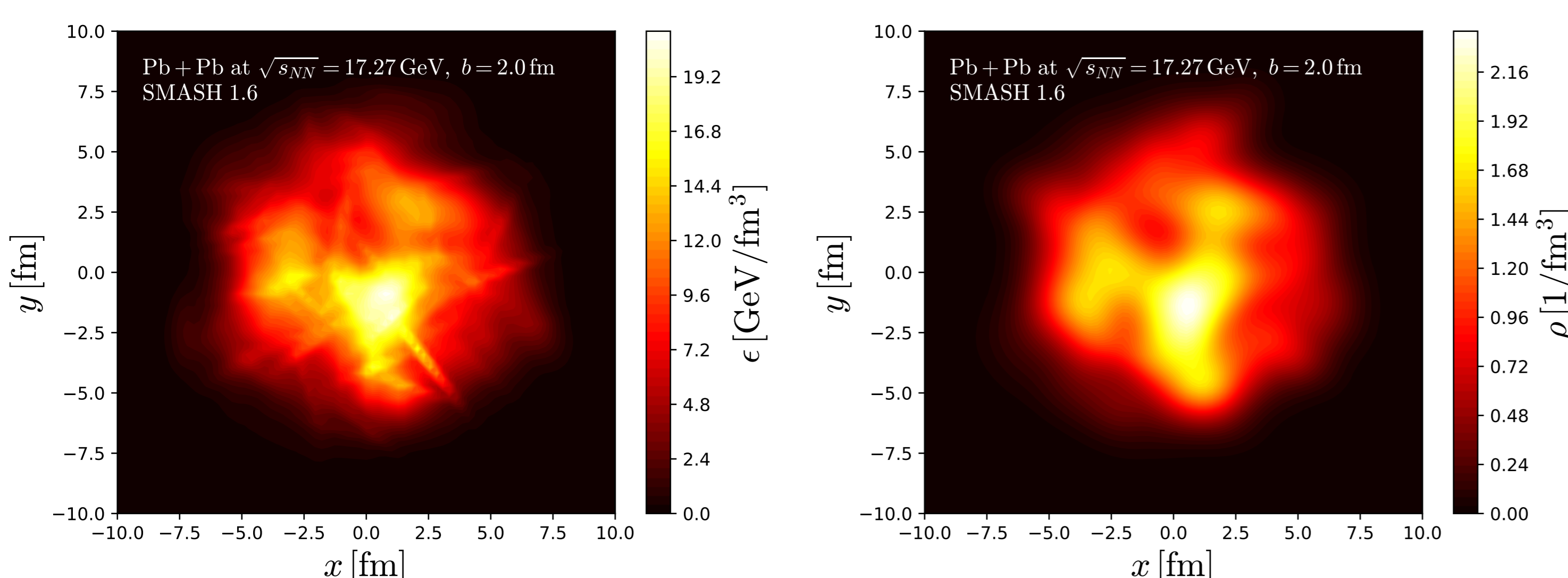


Conclusions

- String model is introduced and tuned to experimental data from p+p collisions
- Details of particle formation are investigated with respect to their effect on baryon stopping
- Good agreement with proton and pion rapidity spectra over the SPS energy range is achieved

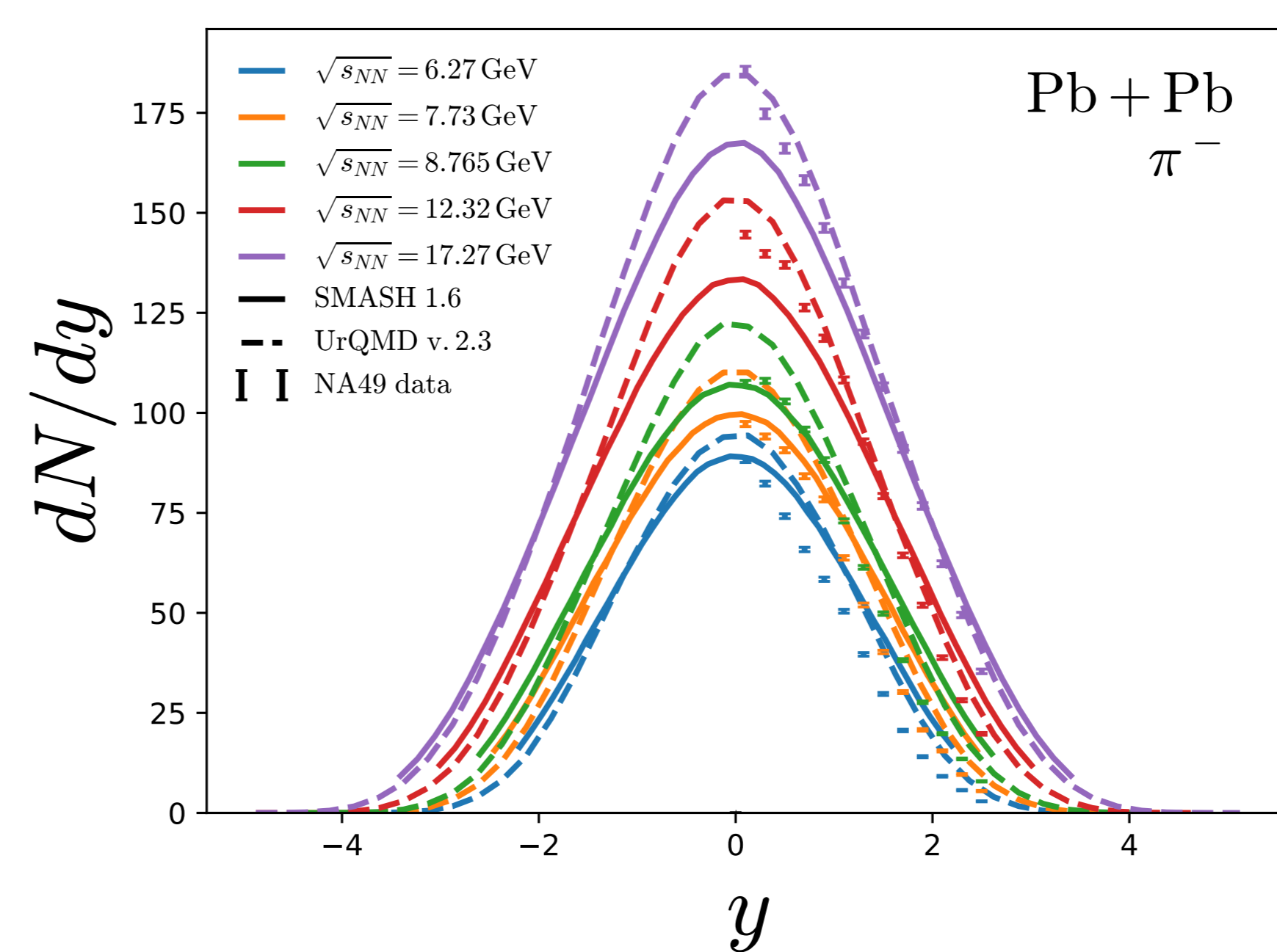
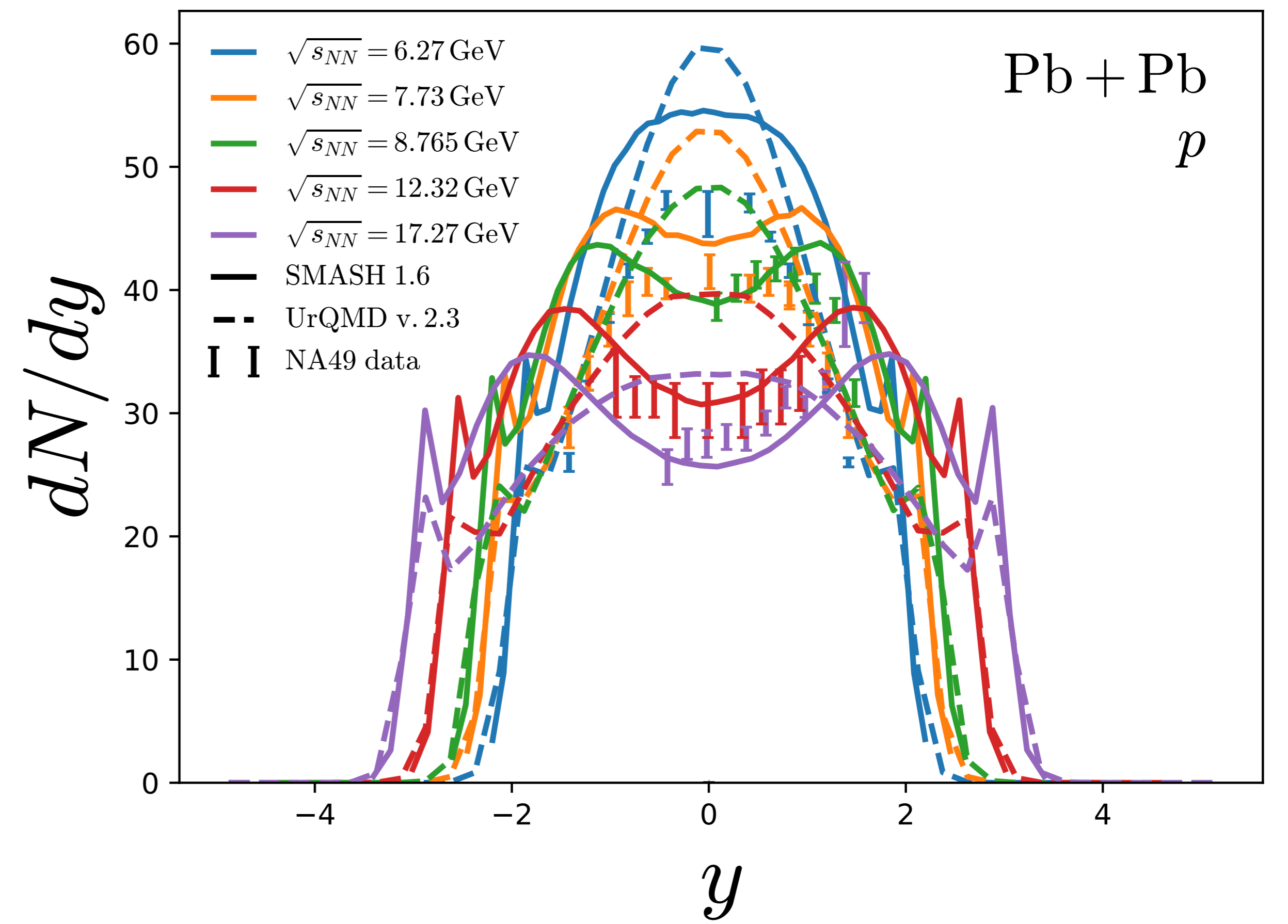
Outlook: Initial State Calculations

- Calculation is stopped immediately after nuclei pass through each other
- Thermodynamic quantities are calculated as a starting point for a hydrodynamic evolution



- Full 3D phase space information for all conserved charges is available

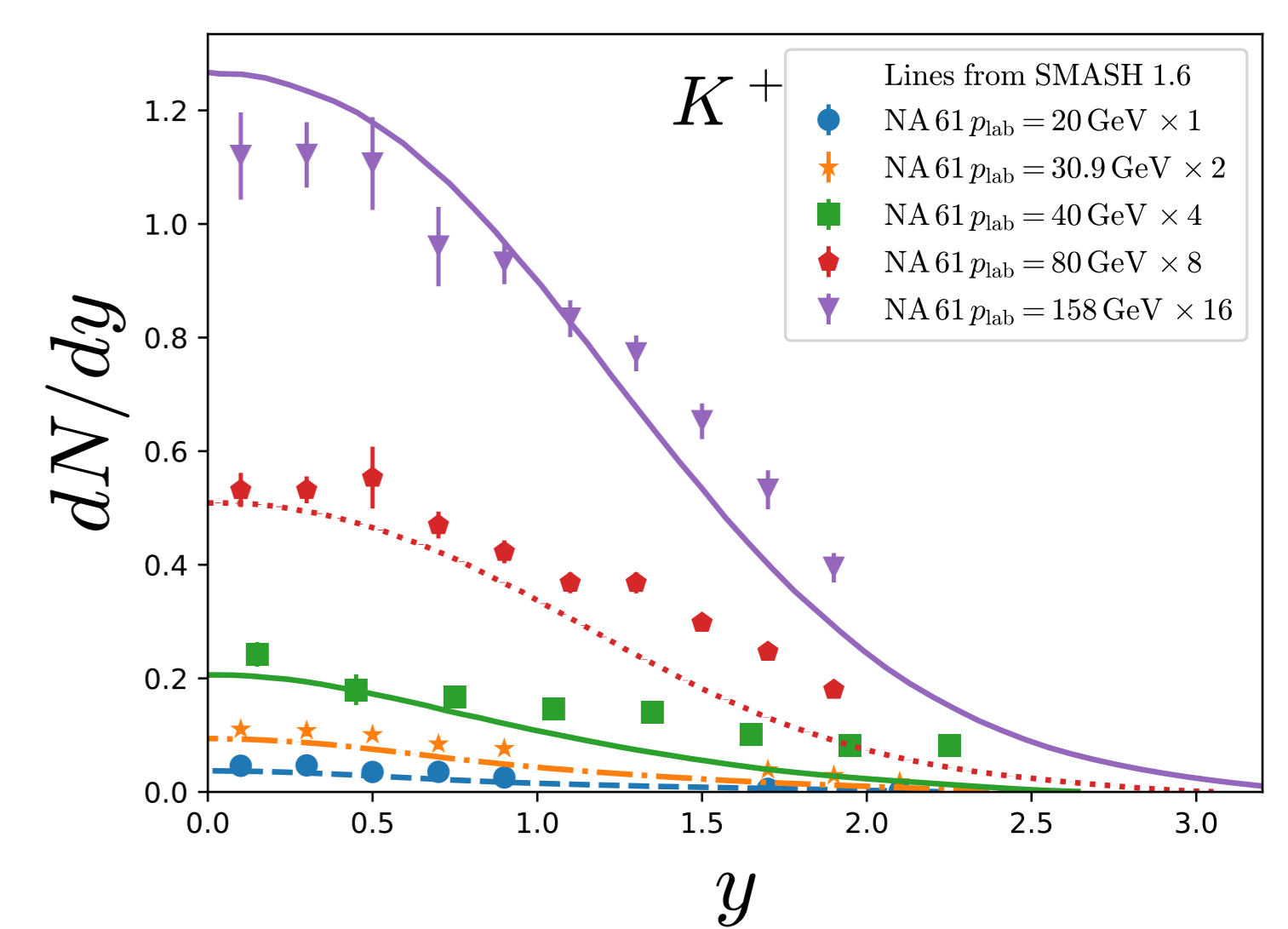
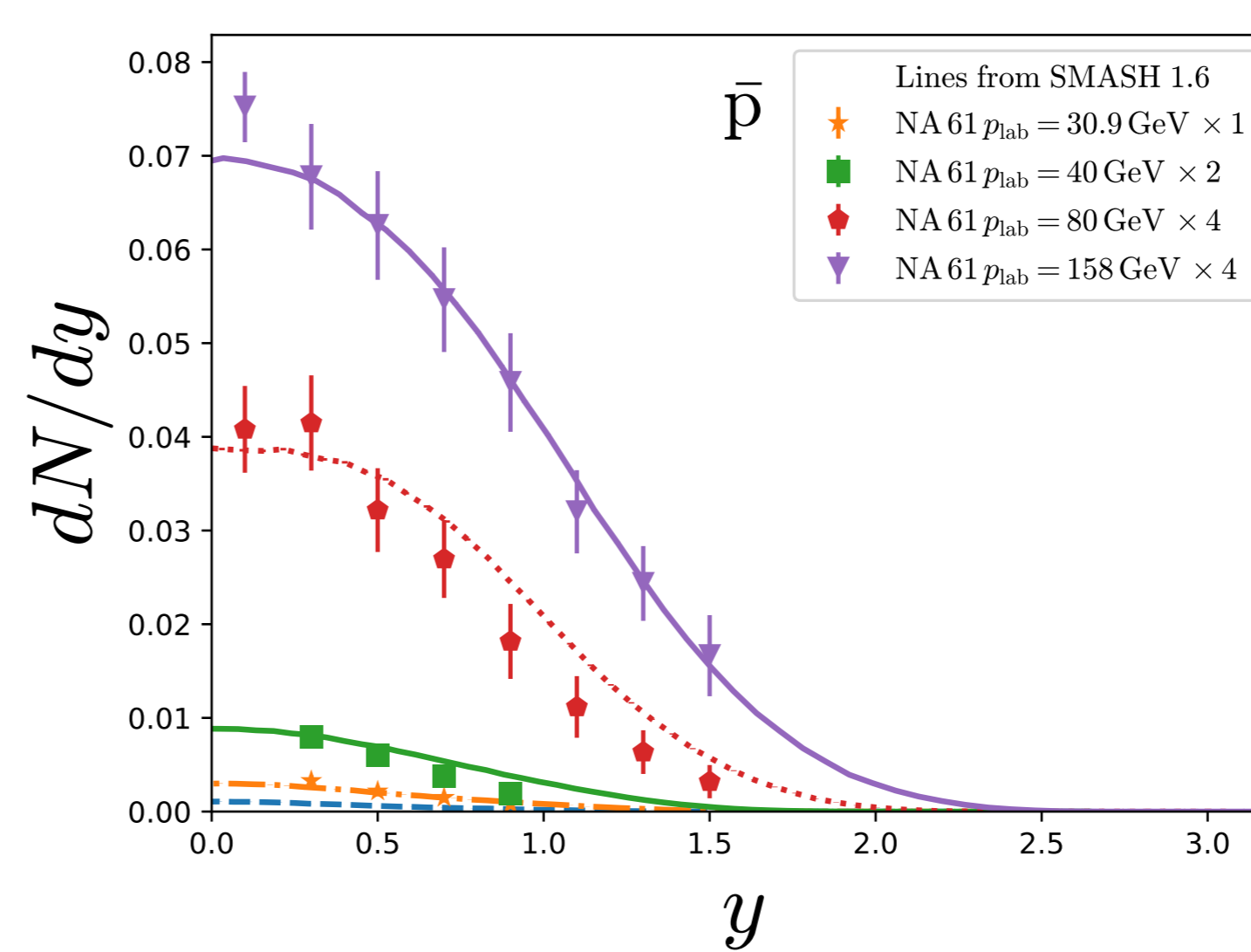
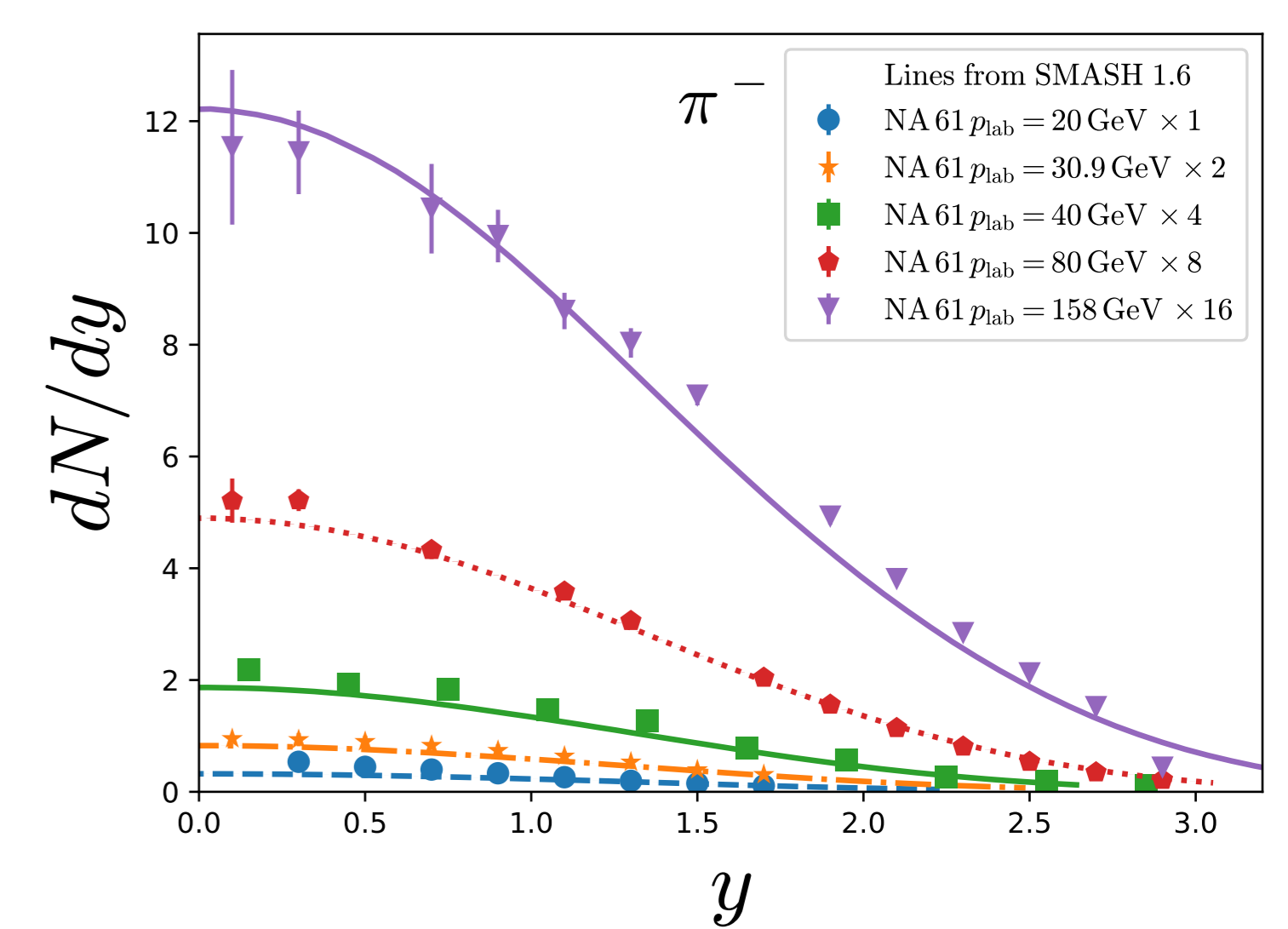
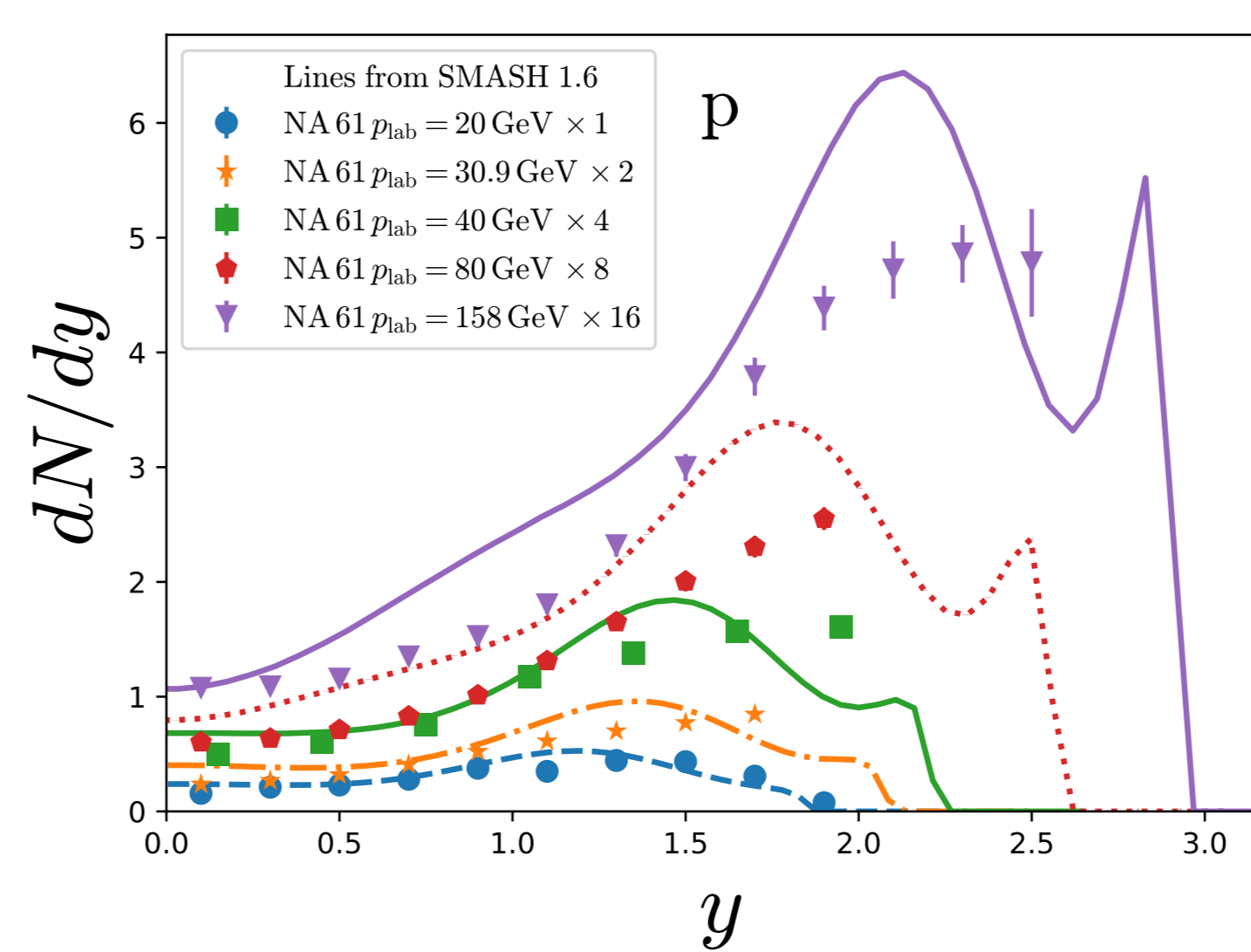
Results for Heavy Ion Collisions



- Transition to a double peak structure with increasing energy reproduced
- Proton yield at low collision energies is slightly overestimated
- Pion production slightly lower than in UrQMD but agrees with data especially for low energies

Results for p+p Collisions

- Model is tuned to new NA61 data of proton-proton collisions

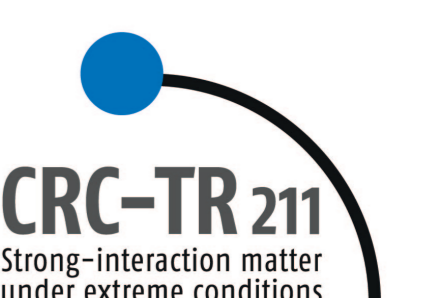


- Good agreement for most abundant particle species is found

References

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