Friday discussion

- Outline for next weeks writeup and action items
- Transport codes
- Pion production and pi+/pi- ratio at low energies

ICNT writeup

- Focus on action items (need context) for theory, experiment
- Visionary
- Intellectual content: link between astrophysics and nuc physics, dense QCD
- Unique: HI collisions, astro observations only way to study high densities.
- Astrophysical observations have real nuclear physics implications.
- We can not calculate at high densities!
- We are probing the ultimate limits of matter: We are studying in the lab the highest possible densities, before matter as we know it collapses into a black hole. The ultimate limit on the stability of matter.
- Femtonova, femto neutron star merger
- Nuclear physics session at AAS meetings (every year/ establish a tradition?). Organize with JINA
- Keith Gendreau (PI of NICER on space station) at Goddard, instrument designer. Zaven Arzoumanian deputy PI NICER

- A way forward ON THE STUDY OF THE SYMMETRY ENERGY: experiments, calculations, and observations

I) Introduction: definition of symmetry energy, important role in extrapolating laboratory experiments to very neutron rich astrophysical systems.

II) Low density

A) Symmetry E at very low density in nonuniform matter

1) The supernova neutrinosphere problem

2) Descriptions of clusters in low-density matter

3) NuSphere@RIB

B) Nuclear structure and symmetry energy

1) Neutron skins and L, existing “measurements” of Sn skins

2) Pygmy, GDR, dipole polarizablility

3) Mass formulas, isobaric analogs

4) PREX/ CREX

C) Heavy ions at low densities

1) Observables

2) Ways to describe cluster formation

D) Nuclear pasta and symmetry E [Perhaps cut]

- III) High density
- A) Neutron star radii
  - a. In globular clusters.
  - b. In X-ray bursts.
  - c. Implications if small radii correct.
  - d. Ways to improve radii measurements. Address systematic uncert. atmospheric content (observe companion star type), magnetic fields, ...
  - e. Design inexpensive new X-ray mission with better spectral resolution for measuring masses / radii with qLMXB.
- B) Neutron star cooling.
- C) Hyperons, hypernuclei, hyperon EOS and three body forces.
- D) HI Transport codes and transport code (and data) archive.
- E) Sym E observables for HI collisions
- F) Future HI measurements with stable beams
- G) Future HI measurements with radioactive beams
- IV) Conclusions, implications for dense QCD