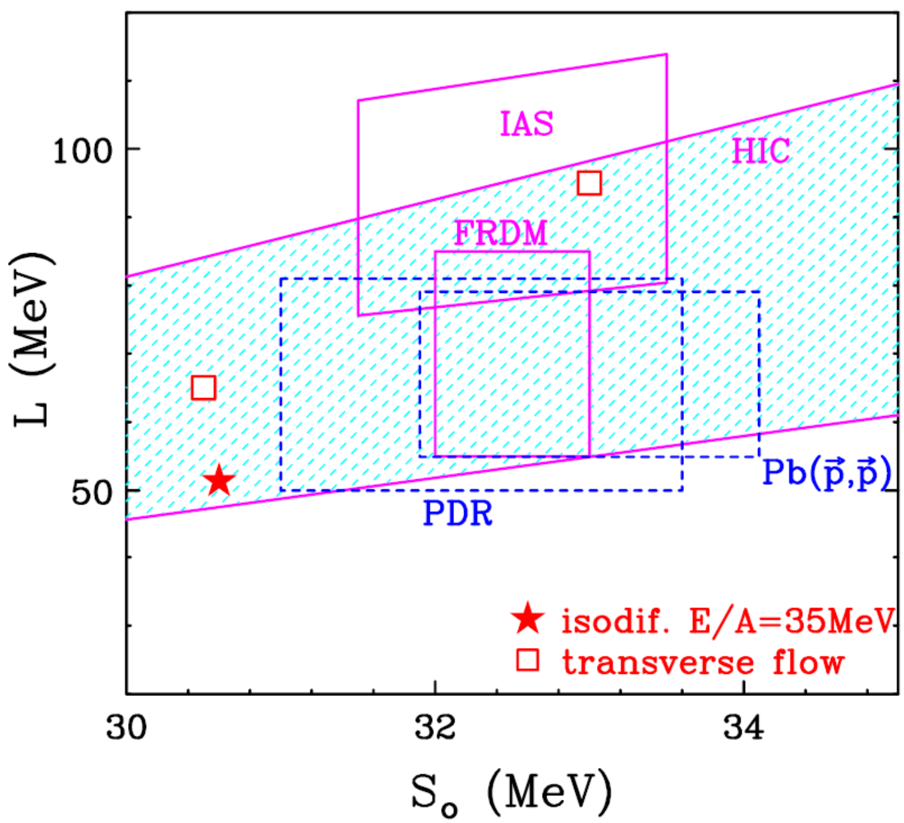
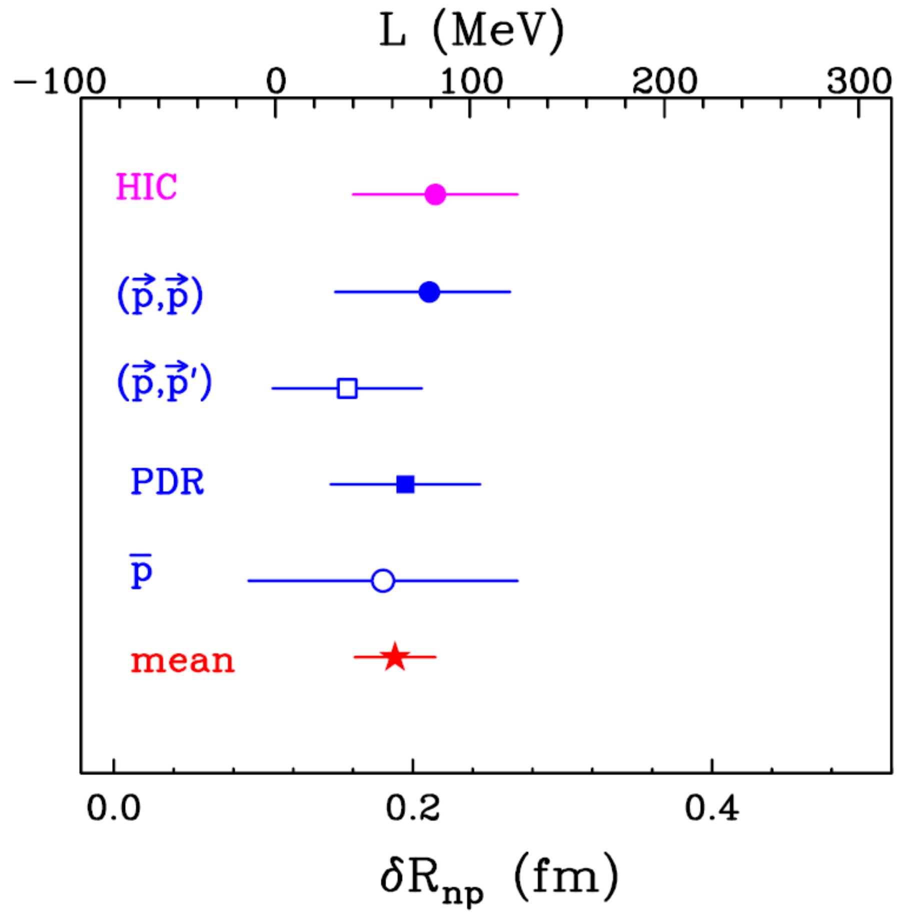
Key issue: Each observable provides the same (correct) conclusion about the EoS

Examples: Cross comparison of Pb skin thickness and symmetry energy constraints





Diverse experiments but consistent results: (As the precision of these probes improves, we will become more sensitive to systematic theoretical errors.

1. Model dependence, model inadequacies
2. Sensitivity to other poorly determined theoretical quantities.
3. We need theoretical work to identify and solve these problems

Theoretical challenges for collisions studies

Interpretation depends on comparison of data to models
Nuclear collisions – time dependent, many-body problem

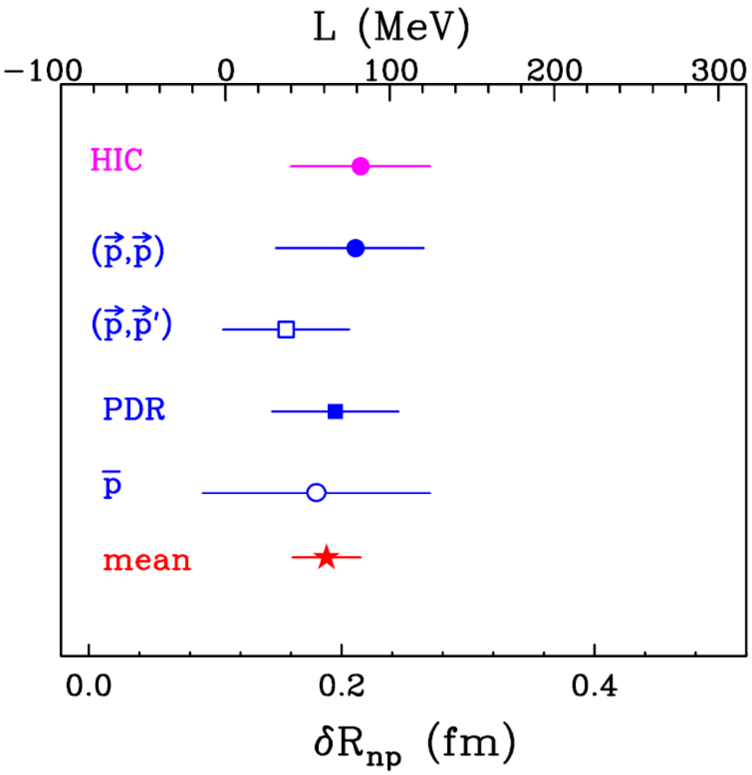
Transport models:
- ***Describe dynamical evolution of the collision process***
- ***Self consistent mean field***
- ***n-n collisions,***
- ***Pauli exclusion***

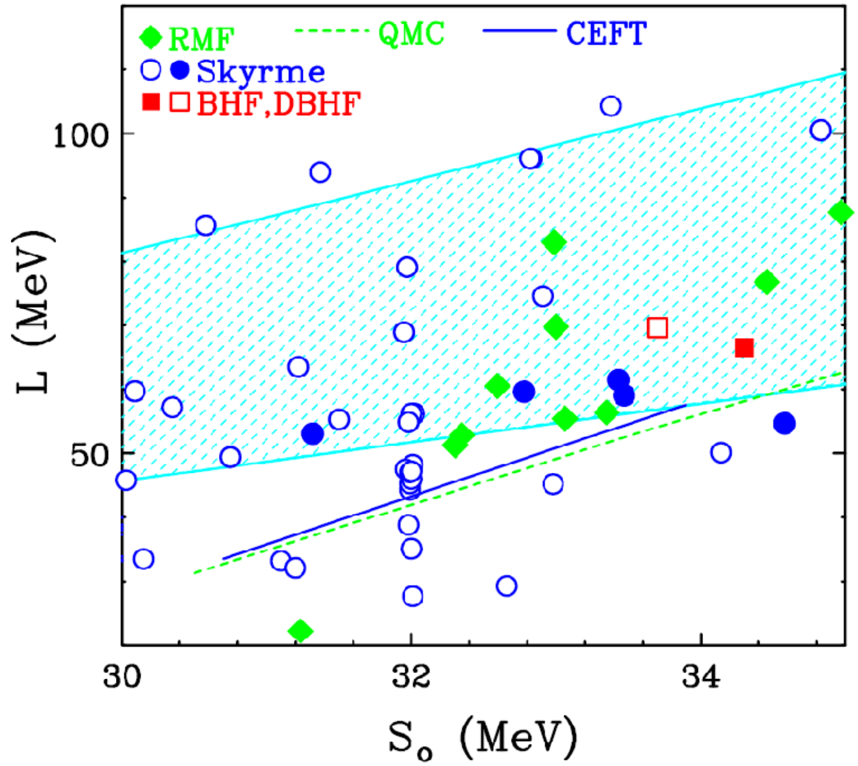
Uncertainties
Semi-classical
Approximations introduced to simplify computation.

Strengths:
Mean field potentials computed self consistently. Can often use same effective interactions as used structure or astrophysics calculations.

Wish lists
- ***Inclusion of standard implementations of transport model parameters –σ_{NN}, m*, momentum dependence mean fields, Pauli Blocking.***
- ***Better understanding of approximations. Improved predictions for production of bound light nuclei.***
- ***Better description of surface properties of nuclei.***
- ***Implementation of pion production and isospin dependence of effective masses in all models.***
- ***Self-consistent treatment of mean field an d collisions***

Symmetry energy and skin thickness constraints from nuclear structure





Interactions used in models:

A. Macroscopic models:

B. Phenomenlogical models:

RMF & nonRMF modles using Skyrme interactions & other effective interactions

Uncertainties

Need realistic evaluations of Model uncertainties