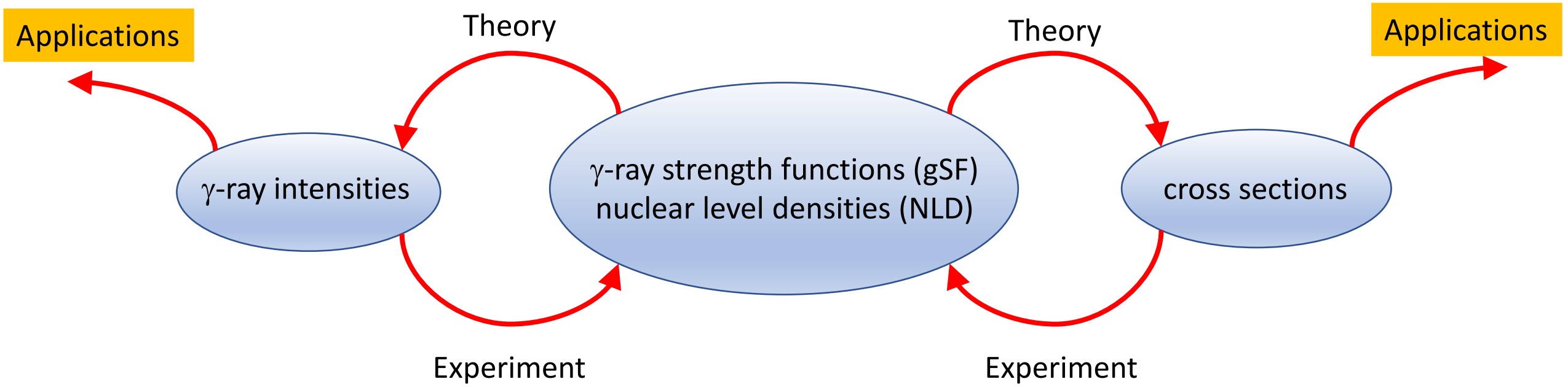
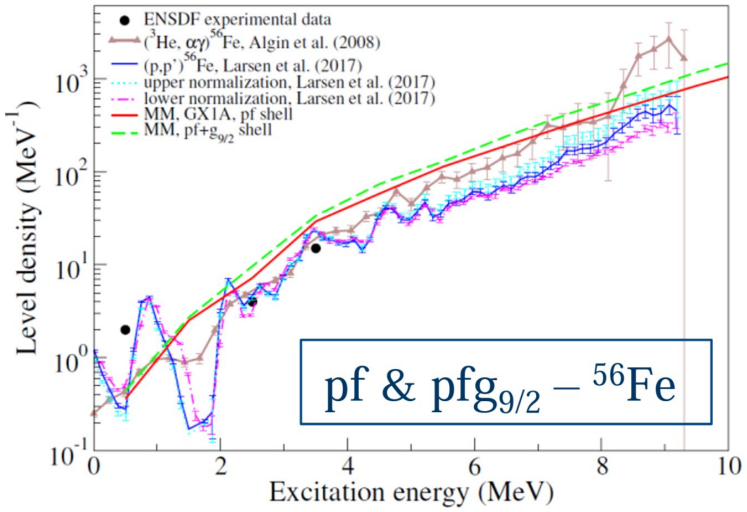
Session I: Gamma Strength Function & Level Density

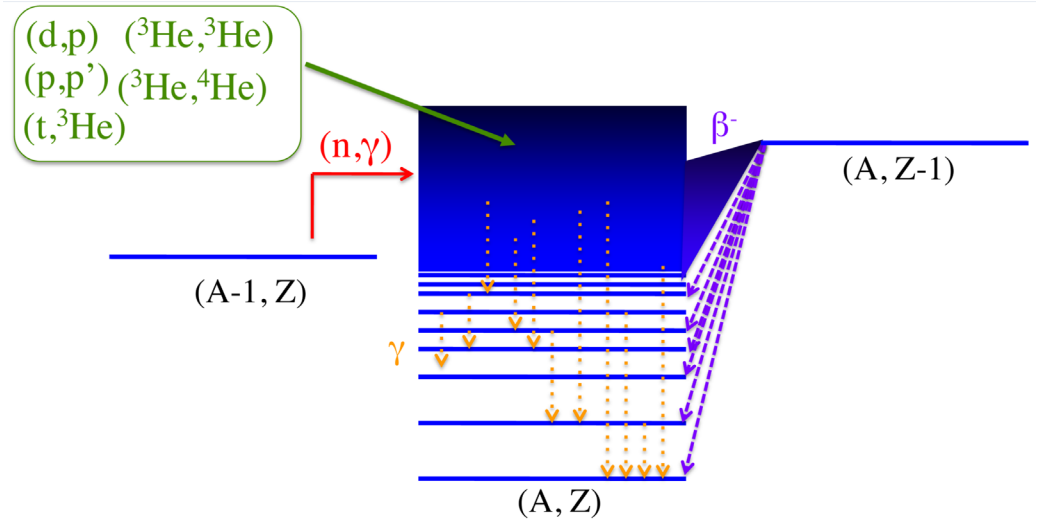


10 Talks from leaders in NLD/gSF experimental and theory work

<u>Experiment</u>

Lee Bernstein	Introduction/summary
Paul Koehler	Neutron resonance parameters to improve gSF
Sean Liddick	b-Oslo method to extract NLD/gSF from rare isotopes
Alexander Voinov	Particle evaporation technique for determining NLD
Andrea Richard	Indirect (n,g) measurement techniques



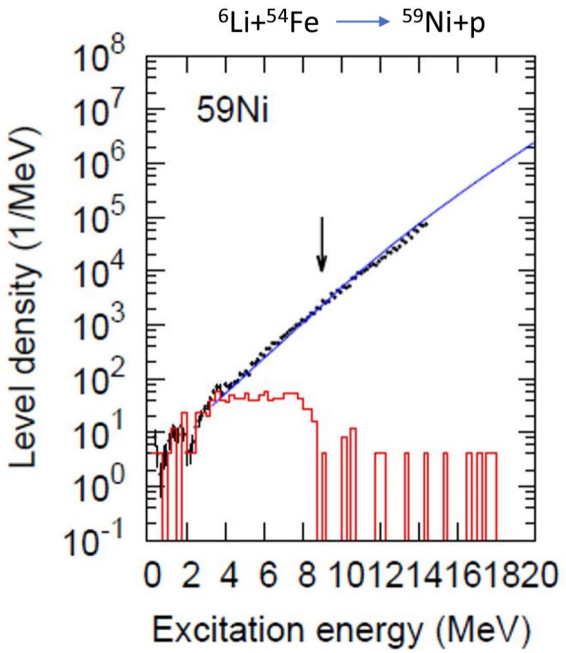


<u>Theory</u>

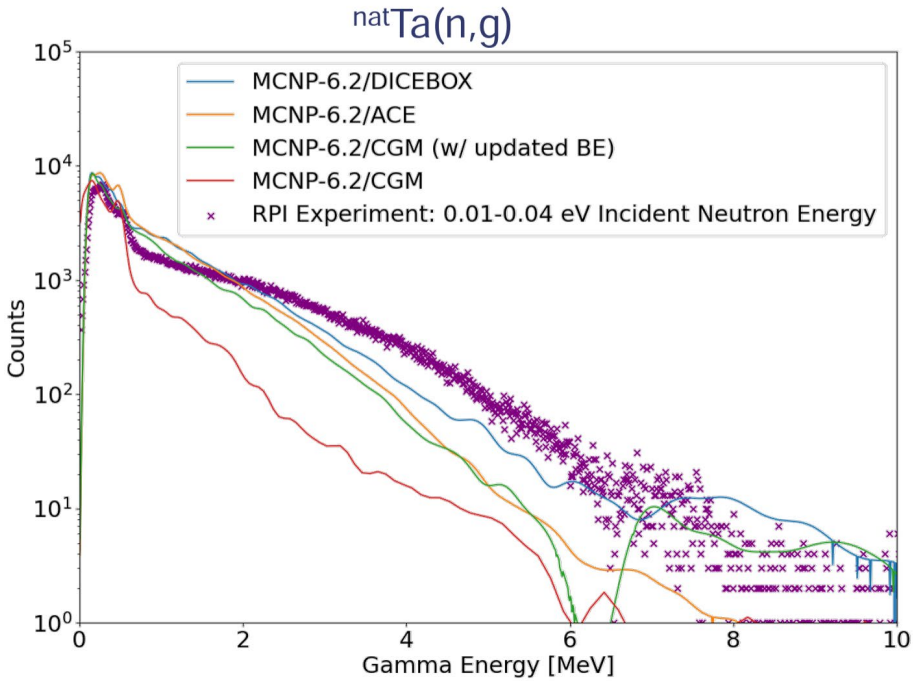
Jutta Escher	TLC: Targeted Experiments, Lots of Theory, Considered Experiments
Matt Mumpower	Uncertainties in capture rate calculations due to NLD and gSF
Sofia Karampagia	Modern NLD calculations using microscopic nuclear theory
Nicolas Schunck	Modern gSF from extended QRPA and FAM
Amanda Lewis	The case for an evaluated NLD/gSF database

Experimental techniques for determining QC properties

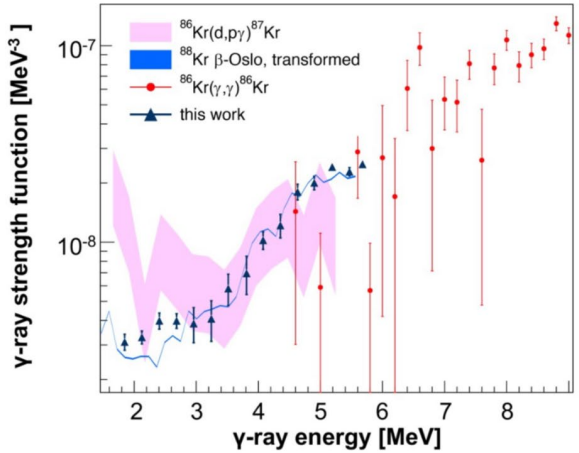
1. Energy indexing approaches
   a) Reaction-based (Surrogate, particle scattering, particle evaporation)
   b) Oslo methods (beta-Oslo, Shape method analysis)
2. Photo-absorption
3. High resolution (n,g)
4. (n,n'g) and neutron evaporation spectra

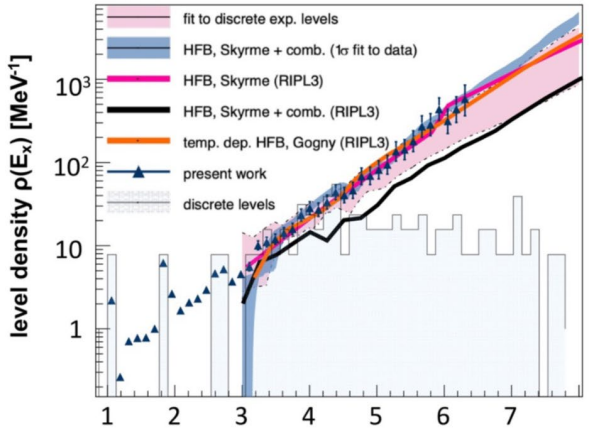


Particle evaporation to determine NLD (A. Voinov)



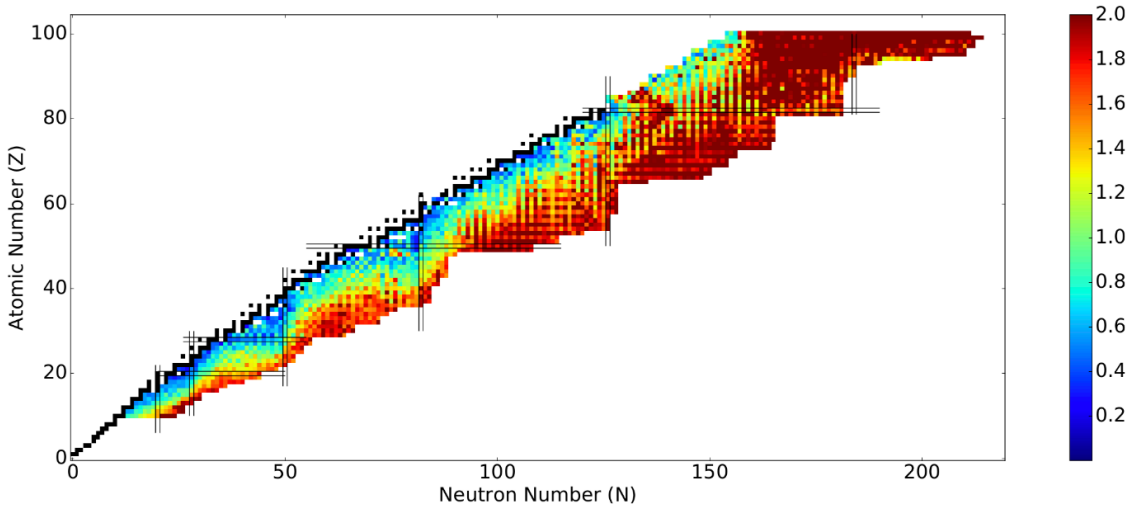
RPI Gamma Multiplicity Counter Data against several gamma-cascade models (A. Lewis)



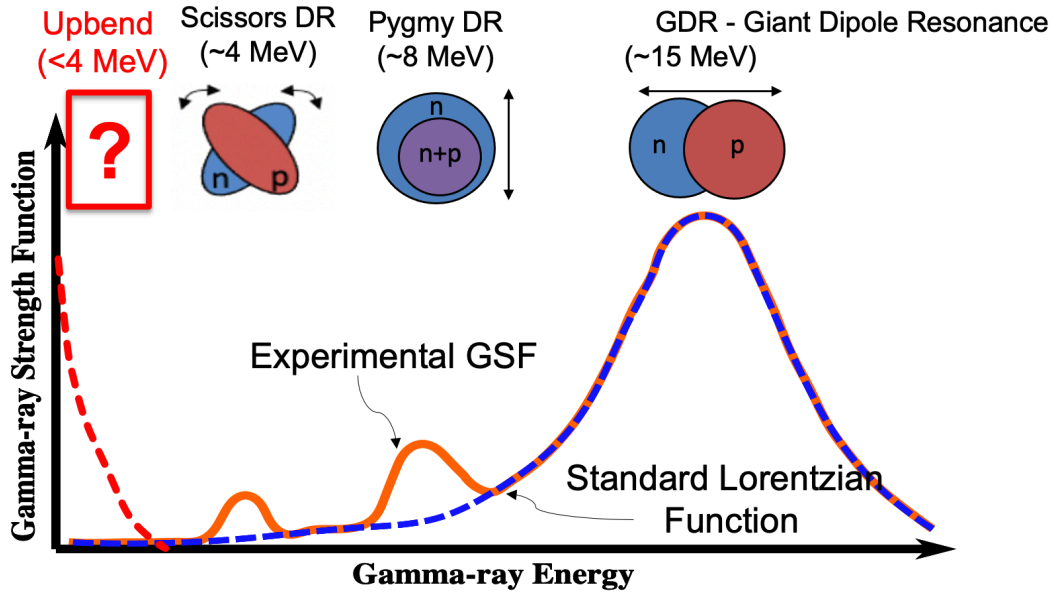


Shape-method results to eliminate theoretical normalizations for Olso method. (A. Richard)

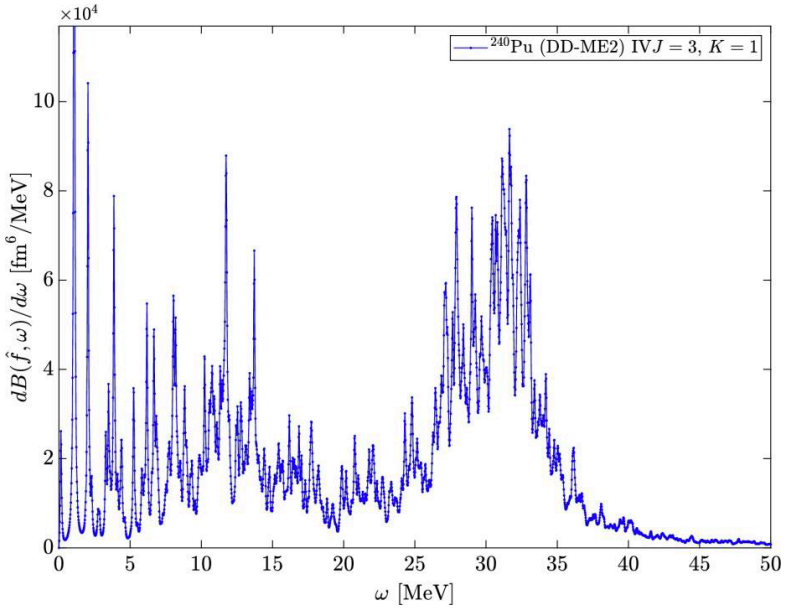
Theory



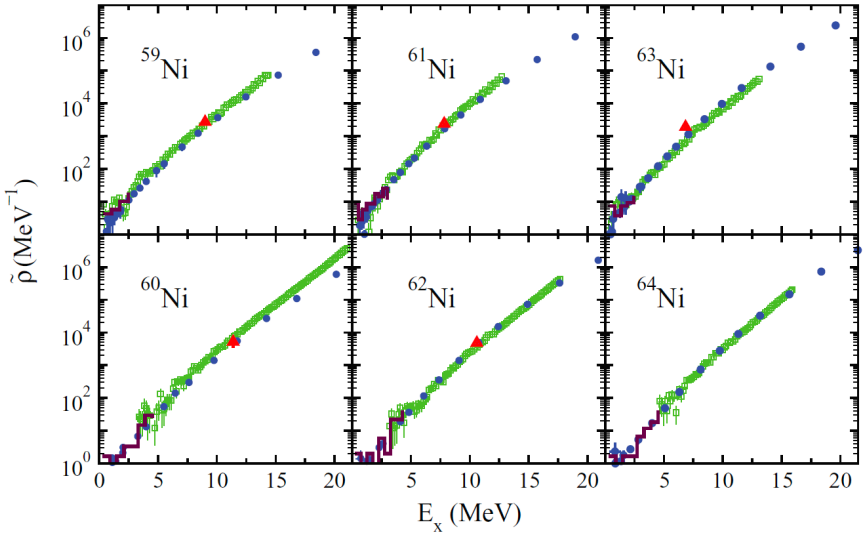
A. Richards and M. Mumpower: γSF uncertainties lead to large (n,γ) uncertainties



J. Escher: Deeper understanding of the underlying nucl. structure



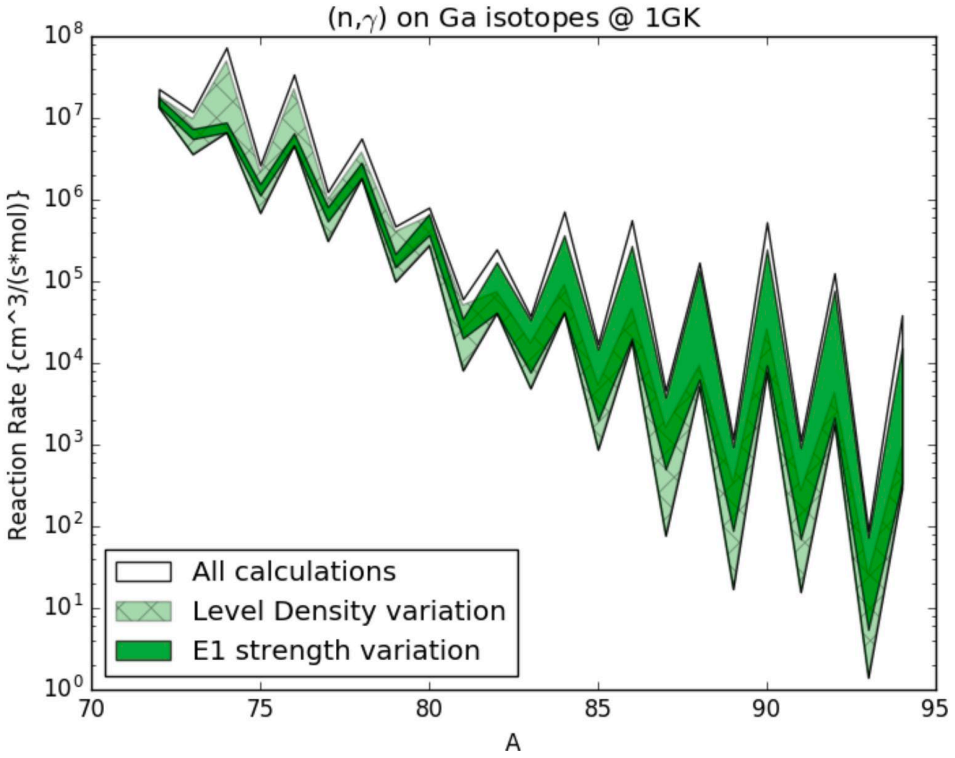
γ-ray strength from QRPA calculations N. Schunck



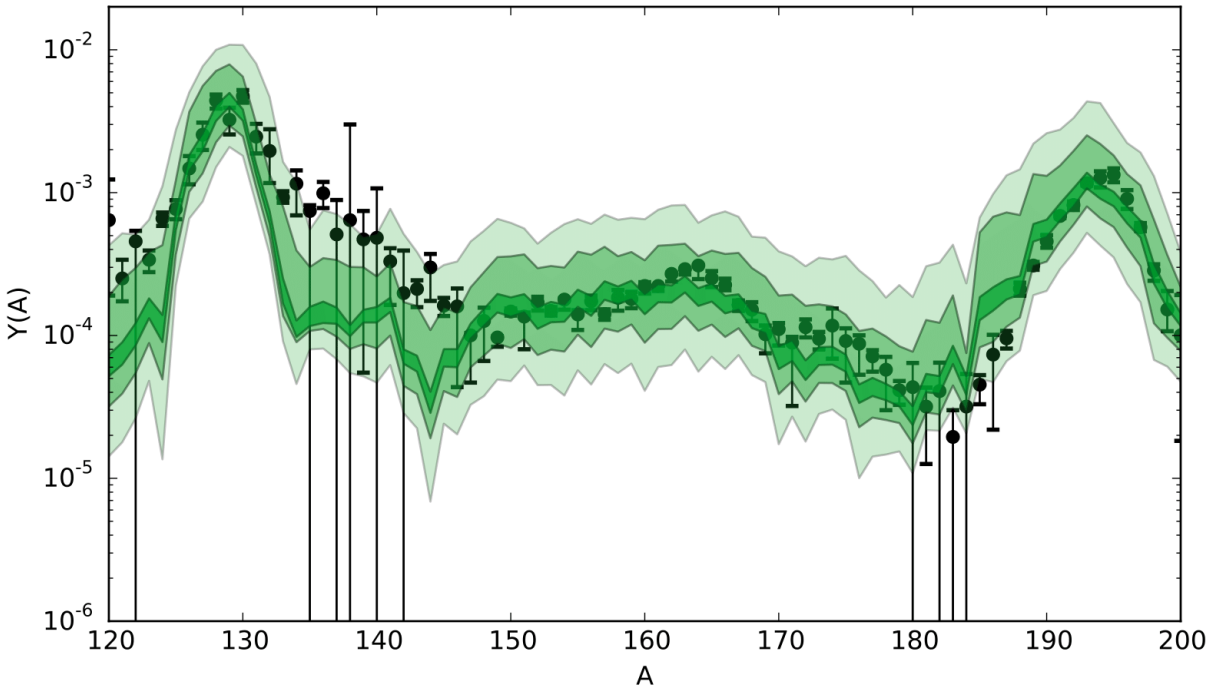
Level densities from shell-model calculations by S. Karampagia

Challenges

Relevance and uncertainties



M. Mumpower



Factor uncertainty: 100 10 2

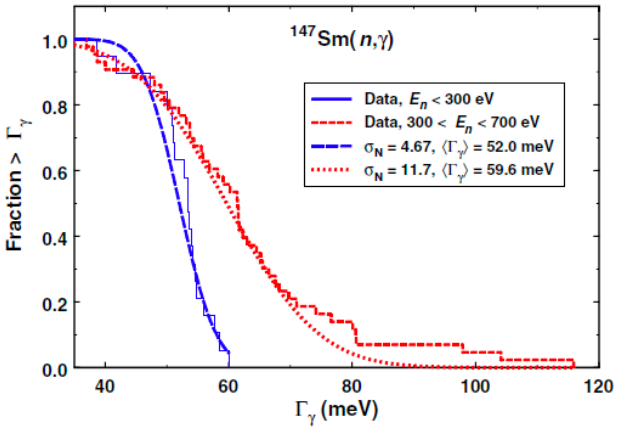
S. Liddick

Monte Carlo variation of reaction rates for all nuclei out to the dripline

Current uncertainties likely around an order of magnitude (or more) far from stability

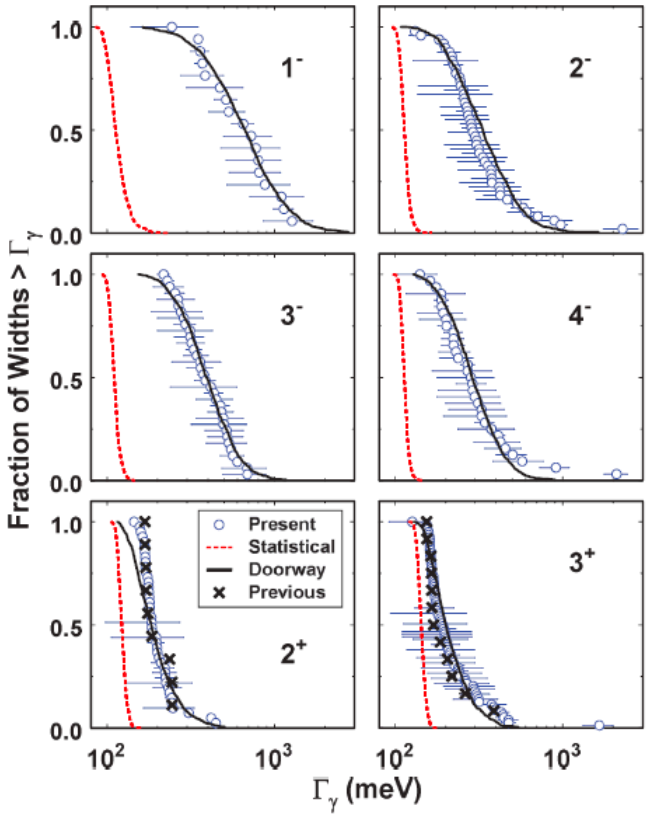
Challenges

Theory development is needed



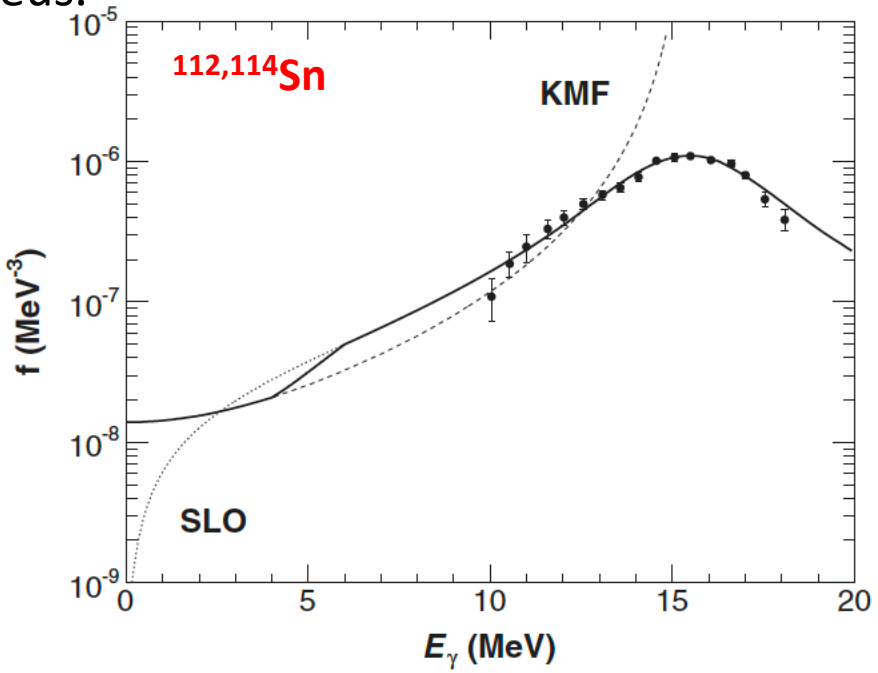
Statistical behavior

P. Koehler



Nonstatistical behavior

Using two γ-ray strength functions within the same nucleus.

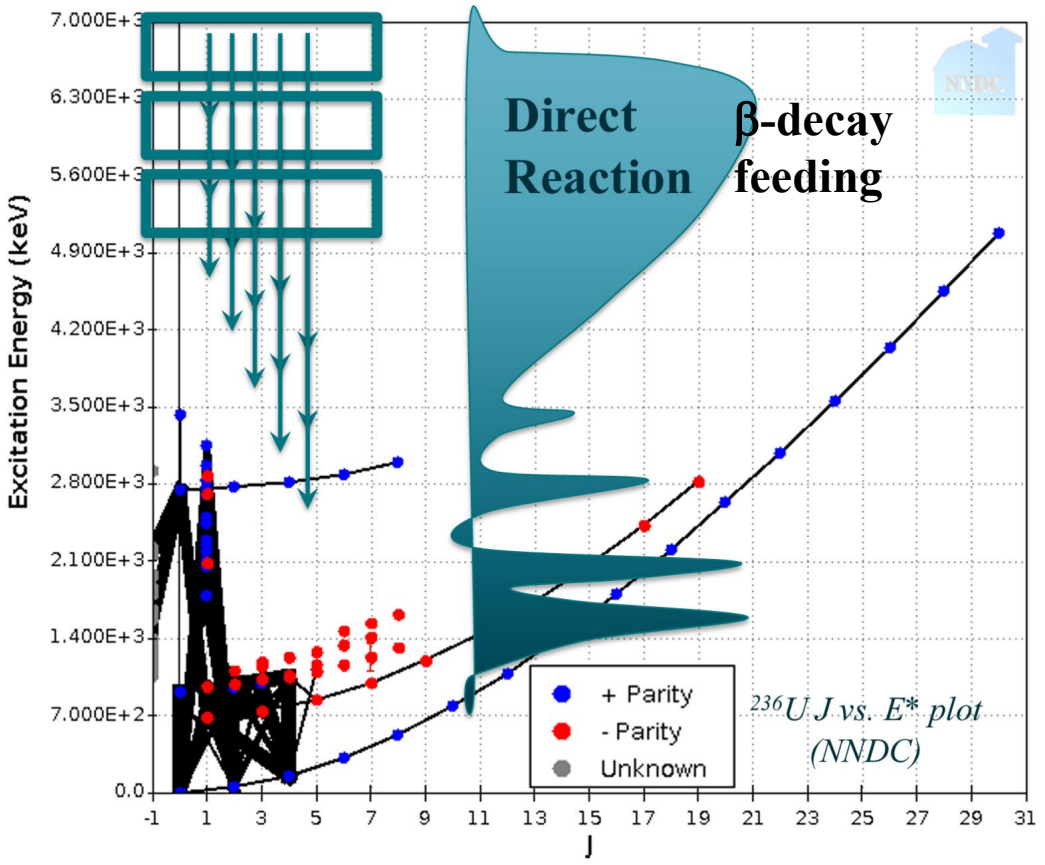


γ-ray cascades to the ground state are described by SLO, while γ-ray cascades to the first 2+ state are described by SLO+KMF.

Recommendations for future work:

1. Development of Evaluated QC properties library
   → Preferred gSF/NLD models for reactions
2. Targeted experiments to push theory forward
   →Identify needs and create experiment to target resolving specific questions/challenges
   <u>gSF:</u>
   Microscopic explanation of features?
   Dependence on deformation, mass, N?
   Limits of Brink-Axel assumption(s)?
   <u>NLD:</u>
   Correlations in LDs?
   Impact of deformation, spin-dependencies, non-equal parities?

3. Experimental neutron-rich anchor points to benchmark theoretical developments
   → Complete spectroscopy experimentation



Complete spectroscopy may be necessary to enable a full description of gamma emission from neutron capture. Encompassing both discrete level information and QC information.