Indirect measurements of statistical reaction cross sections Input for FRIB-TA discussions

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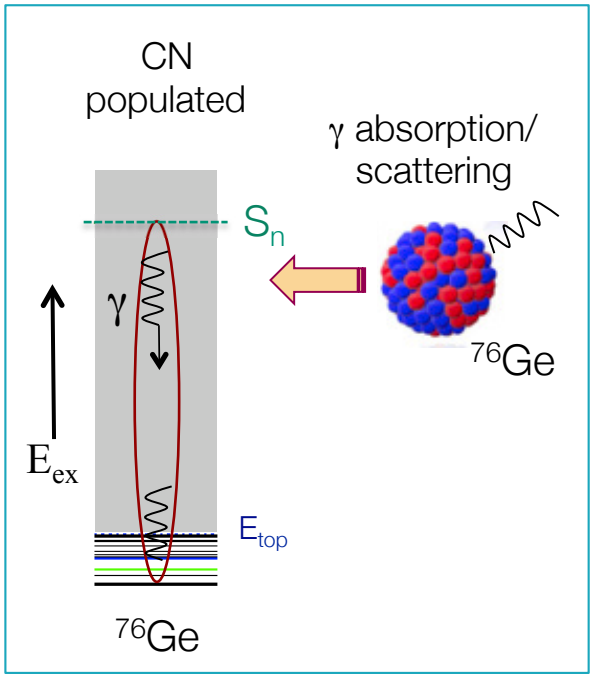
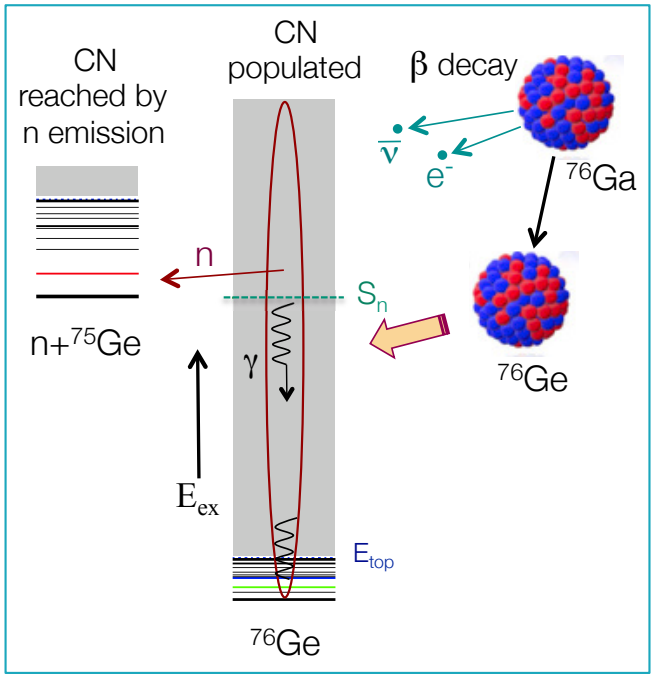
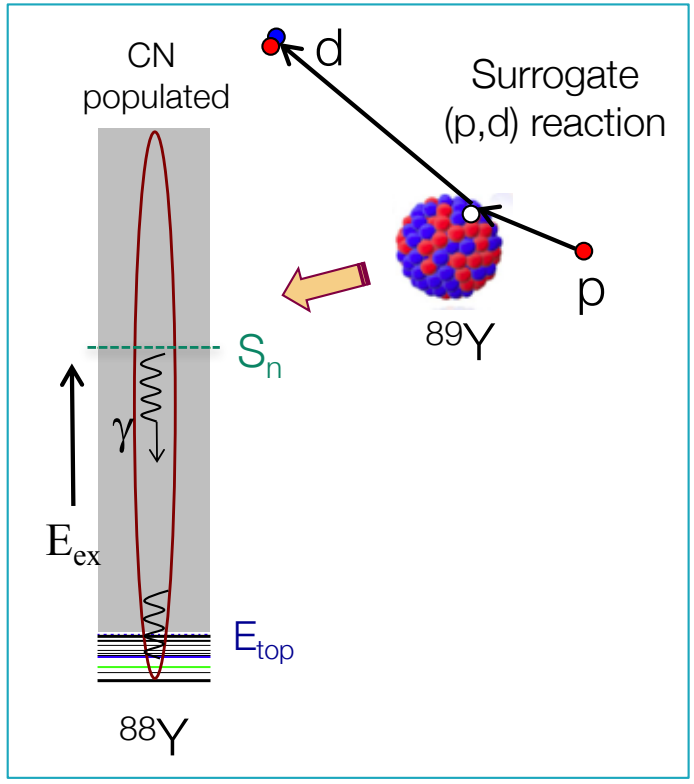
Theory is needed to make indirect cross section measurements work

Challenge

- Astrophysics and other applications need cross sections for compound (statistical) reactions on unstable isotopes
- Measurements require indirect approaches, which produce the compound nucleus using inelastic scattering and transfer reactions (in inverse-kinematics experiments), γ absorption/scattering, or β decay (examples of recent measurements below)
- Measurements do not give the cross section, but some related information (e.g. observables for the decay of the compound nucleus)
- **Theory is critical to extract the cross section from the data**







Needed

- To provide reliable description of the indirect processes, reaction theories need to be revisited and extended (eg accounting for breakup-fusion in (d,p), two-step contribution in (p,d),…)
- Close connection between theory & experiment to test the ideas for benchmark cases