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First high-accuracy, model-independent NRF measurements on ^{78,80}Kr$ to constrain photon strength functions for p-process nucleosynthesis calculations

Thursday, October 9, 2025 11:35 AM (30 minutes)

This presentation brings into focus ^{78,80}Kr(γ,γ') cross section measurements carried out using real photons at the HIGS/TUNL facility. The overarching physics motivation for these experimental investigations is to advance knowledge on a forefront topic in nuclear astrophysics –the nucleosynthesis beyond Fe of the rarest stable isotopes naturally occurring on Earth (the origin of p-nuclei) by constraining the statistical models that are used to calculate the unknown stellar reaction rates. In particular, these stellar reaction rates are highly sensitive to the low-energy tail of the nuclear photon strength function (PSF).
Due to its high selectivity for dipole excitations, real photon scattering via nuclear resonance fluorescence (NRF) is the method of choice to extract experimentally, with high accuracy and model independently, the dipole PSFs in stable nuclei. The quasi-monochromatic and linearly
polarized photon beam of very high flux available at HIGS makes this facility ideal for investigation of photoabsorption reaction cross section with p-nuclei as targets.
The NRF measurements on ^{78,80}Kr will provide for the first time information for the low-energy part of the E1-PSF in ^{78,80}Kr, as direct input into the p-process nucleosynthesis modeling.
In this presentation we will report on the status of data analysis of these recent measurements.

Primary author: Prof. BANU, Adriana (James Madison University, Department of Physics and Astronomy)

Presenter: Prof. BANU, Adriana (James Madison University, Department of Physics and Astronomy)

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