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Single Particle states in ^{131,133}Sn and r-process nucleosynthesis[1]
MICHAEL SMITH, ORNL Physics Division, SHISHENG ZHANG, Beihang Univ., RAY KOZUB, Tennessee Tech. Univ., GORAN ARBANAS, ORNL Reactor and Nuclear Systems Division — The (d,p) transfer reaction was recently used with radioactive ^{130}Sn and ^{132}Sn beams to determine four strong single-particle bound levels in ^{131,133}Sn. These levels have strikingly similar excitation energy spacings that have not yet been addressed by a theoretical nuclear structure model. Information on these single particle bound levels, as well as on resonant levels above the neutron capture threshold, are also needed to determine the ^{130,132}Sn neutron capture cross sections – and their corresponding thermonuclear reaction rates – which (in the case of ^{130}Sn) significantly impacts the synthesis of heavy elements in the r-process in supernovae. We used the analytical continuation of the coupling constant (ACCC) method based on a relativistic mean field theory with BCS approximation to self-consistently calculate single-particle bound and resonant levels for ^{131,133}Sn. Our results for the single particle bound and resonant levels in ^{131,133}Sn will be presented, along with our level densities and the implications for neutron capture cross sections for r-process studies.

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Michael Smith
ORNL

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