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Spectroscopic studies of ^{116,118,120}Sn through thermal neutron induced reactions using FIPPS

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Studies of tin isotopes are important for understanding the structure of singly-closed shell nuclei. The ^{116,118,120}Sn isotopes are examples of even-even singly-closed shell nuclei close to the line of stability. Using (n_{th}, γ) reactions provides a comprehensive study of the level scheme of a nucleus. Despite many previous studies for stable tin isotopes, many nuclear levels are missing spin and parity assignments. Experiments involving ^{116,118,120}Sn were conducted in 2018 at ILL, Grenoble, using FIPPS (FIssion Product Prompt γ-ray Spectrometer), which uses eight highly efficient, clovered, n-type, HPGe detectors to measure low intensity gamma rays. This aids in identify previously unknown transition multipolarities, and thus, provide the spin states of ambiguous energy levels. % work on this In the study of ^{116}Sn, sixteen ancillary $LaBr_3$ detectors were used in the experiment to provide ps timing measurements to deduce state lifetimes. The experiments involving ^{118,120}Sn featured eight additional HPGe clovers, from IFIN-HH (Horia Hulubei National Institute of Physics and Nuclear Engineering), to further improve the array's efficiency. The high number of statistics that FIPPS provides aids in making polarization measurements and angular correlation measurements to identify the spin states of energy levels without definite properties. Study of the electromagnetic character of weak transitions in tin will establish the parity of the de-excited states, help complete the understanding of singly-closed shell nuclei, and nuclear structure as a whole. The current work being done to study the tin species will be presented.

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