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Photon strength functions from (p, γ) reactions

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In the 1970s and 80s (p, γ) reactions were successfully utilized to measure the photon strength function (PSF) using the Average Resonance Capture Method [1] and this work seeks to explore these reactions to measure the PSF using the ratio and X2 method [2]. The 50Cr(p, γ)51Mn capture reaction has been used to study primary γ -ray transitions from the entry states between the proton and neutron separation energies to discrete states of known spins and parities. For a proof-of-principle experiment, the Tandetron accelerator at iThemba LABS was used to deliver proton beams of 2.5 to 3 MeV and 3.675 to 4.498 MeV in intervals of 20-25 keV with beam currents of up to 5 \boxtimes A. The primary γ -rays emitted from the reaction were detected using one segmented Clover detector placed at 90° to the beam direction. A total of 64 gamma-ray spectra were collected with 26 and 38 of these spectra collected for 2.5 to 3 MeV and 3.675 to 4.498 MeV beam energies respectively. The level scheme of the 51Mn compound nucleus was built with several new transitions and states being identified. The average intensities of the primary γ -rays decaying to discrete states of known spin and parity were extracted. The PSF of 51Mn will be extracted using the ratio and X2 method [2]. In this talk, I will present the analysis and preliminary results on the extraction of the PSF of 51Mn populated using 50Cr(p, γ) reaction.

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