

Gamma-ray line production cross sections in interaction of high energy protons with target nuclei of astrophysical interest: inter-comparison of experimental data measured at the SSC facility over the incident proton energy range, $E_p = 30 - 200$ MeV.

In this presentation, we report differential cross section results for some γ -ray lines produced in the nuclear reactions $^{56}\text{Fe}(p, \gamma)$ (lines at $E_\gamma = 1238$ and 1408 keV), $^{24}\text{Mg}(p, \gamma)$ (lines at $E_\gamma = 440$ and 450 keV) and $^{28}\text{Si}(p, \gamma)$ (line at $E_\gamma = 781$ keV). These results are part of our analysis of the PR 239 experiment, carried out in 2015 at iThemba LABS with proton beams of energies, $E_p = 66, 80, 95, 110$ and 125 MeV using the high energy-resolution Compton-suppressed AFRODITE detection array.

An inter-comparison is made between counterpart experimental data sets measured within our joint collaboration at the SSC facility of iThemba LABS over the whole investigated incident proton energy range, $E_p = 30 - 200$ MeV for checking their reliability and coherence. The harvest of γ -ray line production cross section experimental results obtained in the framework of this collaboration are new, reported for the first time. They can be pertinently used for simulating still not elucidated astrophysical processes like the interactions of low energy cosmic rays in the inner galaxy, and for determining the properties of γ -ray line emitting astrophysical sites such Solar flares and the ISM.

Keywords : High energy proton beams, HPGe clover detectors, γ -ray line production cross sections; Solar flares, ISM.

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Session Classification: Posters