

β spectroscopy of proton-rich nucleus ^{28}S

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As member of the $T_z=-2$ family, ^{28}S is a nucleus rather light near the proton drop line, and has high β -delayed proton (βp) branching ratio. Precise β -decay spectroscopy of proton-rich nucleus ^{28}S serves as a powerful tool to study the isospin symmetry breaking, and to test the unitarity of CKM matrix through the superallowed Fermi transition between isobaric analog states. Nevertheless, only one experimental study was previously published by Pougheon et al. without detecting γ rays in 1989. The present work was conducted at Heavy Ion National Laboratory of Accelerator (HIRFL) in Lanzhou. The interested nucleus ^{28}S was produced through projectile fragmentation (PF) method where $^{32}\text{S}^{16+}$ beam (about 80 MeV/u) bombarded ^9Be target, and subsequently implanted in a detector system composed of double-sided silicon strip detectors (DSSD), quadrant silicon detectors (QSD), and clover-type high-purity germanium detectors. By measuring p and γ following β decay, the half-life and energy with higher accuracy were obtained. Different decay channels were clearly identified through the coincidence method to construct complete decay scheme, and the results were consistent with theoretical calculations. The mirror nuclei ^{28}S - ^{28}Mg was also studied, which gave no evidence for existence of isospin symmetry breaking.