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β-decay spectroscopy of proton-rich nucleus 28S

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As member of the Tz=-2 family, 28S 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 28S 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 28S was produced through projectile fragmentation (PF) method where 32S16+ 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. Based on this detector system, our team has achieved excellent results for 22Si, 26Si, 26P, and 27S in recent years.
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 28S-28Mg was also studied, which gave no evidence for existence of isospin symmetry breaking.

Research field of your presentation

Experimental Low-energy nuclear physics

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