

Exploring the possible two-proton radioactivity of $^{38,39}\text{Ti}$

Two-proton (2π) radioactivity represents a rare decay mode that has been experimentally observed only in a selected few nuclei. The exploration of 2π emission is crucial for elucidating the structure, mass, and nucleon-nucleon interactions within exotic proton-rich nuclei. ^{39}Ti has long been postulated as a potential candidate for 2π emission; however, experimental investigations have yet to confirm its 2π decay. To provide more accurate information for further studies, we utilize the Gamow shell model (GSM) and the Gamow coupled channel (GCC) method to analyze the prospective 2π radioactivity of isotopes $^{38,39}\text{Ti}$. Our calculations suggest that ^{39}Ti is indeed a viable candidate for 2π emission. Notably, the estimated partial 2π decay width for ^{39}Ti , predicted from the three-body GCC method, suggests that its 2π decay could rival its π decay in likelihood, although this is highly dependent on the specific 2π decay energy. Additionally, our analysis indicates a propensity for pairing between the valence protons in ^{39}Ti . A similar investigative approach reveals that ^{38}Ti exhibits a higher 2π decay energy and a broader decay width than ^{39}Ti , positioning it as a more promising candidate for 2π decay.

Research field of your presentation

Theoretical Low-energy nuclear physics

Author: Mr HUANG, Bo (Institute of Modern Physics, Fudan University)

Presenter: Mr HUANG, Bo (Institute of Modern Physics, Fudan University)