Frontiers in Gamma Ray Spectroscopy FIG18

Contribution ID : 5

Nonadiabatic quasiparticle approach to study triaxial proton emitters

Content :

Study of proton emitters is important in nuclear physics and astrophysics both [1, 2]. The astrophysical rapid-proton capture process is inverse of the proton emission from the ground or low isomeric states. We study the structural and decay properties of triaxial proton emitting nuclei with the microscopic nonadiabatic quasiparticle approach [3]. In this approach, the rotor energies and wave functions are employed in the rotation-particle coupling. The structural properties of triaxially deformed nuclei can be studied with this model. In the case of proton emission, the wave function of the particle-plus-rotor system is utilized to calculate the decay width. For the ground state proton emitter 109I, triaxiality is found as $\gamma \sim 15^\circ$ [4]. This nucleus is very important to find the reaction rate of astrophysical rp process proceeding through Sn-Sb-Te cycle [5]. The ground and isomeric states proton emitting nuclei 141Ho, 145Tm and 147Tm are studied with our model. In the case of 147Tm, the ground proton emitting state is confirmed as 11/2− and the isomeric proton emitting state is predicted unambiguously as 5/2+ with triaxial deformation $\gamma \sim 25^\circ$. The 5/2+ state has a maximum contribution from d5/2 and g7/2 orbitals.

[1] E. Maglione, L.S. Ferreira, and R.J. Liotta, Phys. Rev. C 59, R589 (1999); L. S. Ferreira and E. Maglione, Phys. Rev. Lett. 86, 1721 (2001).

[2] L. S. Ferreira, Jour. of Phys.: Conf. Ser. 580, 012034 (2015).

[3] Swati Modi, M. Patial, P. Arumugam, E. Maglione, L.S. Ferreira. Phys. Rev. C 95 024326 (2017).

[4] Swati Modi, M. Patial, P. Arumugam, E. Maglione, L.S. Ferreira. Phys. Rev. C 95 054323 (2017); Phys. Rev. C 96 064308 (2017).

[5] M. Petri, et al., Phys. Rev. C 76, 054301 (2007); E. S. Paul, et al., Phys. Rev. C 51, 78 (1995); C.H. Yu, et al., Phys. Rev. C 59, R1834 (1999).

Primary authors : Dr. MODI, Swati (Department of Physics, Indian Institute of Technology, Roorkee 247667, India)

Co-authors : Dr. ARUMUGAM, P. (Department of Physics, Indian Institute of Technology, Roorkee 247667, India) ; Dr. PATIAL, Monika (Department of Physics, Indian Institute of Technology, Roorkee 247667, India) ; Prof. MAGLIONE, Enrico (Dipartimento di Fisica e Astronomia ``G. Galilei'', and Istituto Nazionale di Fisica Nucleare, Via Marzolo 8, I-35131 Padova, Italy) ; Prof. FERREIRA, Lidia (Centro de F\'\i sica e Engenharia de Materiais Avan\c cados CeFEMA, and Departmento de F\'{\i}sica, Instituto Superior T\'{e}cnico, Universidade de Lisboa, Avenida Rovisco Pais, P1049-001 Lisbon, Portugal)

Presenter : Dr. MODI, Swati (Department of Physics, Indian Institute of Technology, Roorkee 247667, India)

Session classification : --not yet classified--

Track classification : --not yet classified--

Type : Poster