Collective Excited States of Odd Ta Isotopes Built on $g_{7/2}$ Orbital

M.J. Ermamatov[1], **H. Yépez-Martínez**[2], **P. C.Srivastava**[3]

[1]Institute of Nuclear Physics, Ulughbek, Tashkent 100214, Uzbekistan
[2]Universidad Autónoma de la Ciudad de México, Prolongación San Isidro 151, Col. San Lorenzo Tezonco, Del. Iztapalapa, 09790 México D.F., Mexico
[3]Department of Physics, Indian Institute of Technology, Roorkee-247 667, India

In [1] the Bohr Hamiltonian proposed for the three different mass parameters for rotation, β and γ vibration modes. Properties of four well-deformed axially symmetric even-mass nuclei have been studied. It was shown that using different mass parameters is very important in calculating inter-band E2 transition probabilities. The angular momentum dependent value of the β vibration variable was found from the minimum condition of the effective potential. In this case the effect of changing angular moment dependent equilibrium value of the β vibration variable is taken into account.

Davidson potential is well suits for the β vibrations. In Ref. [2], for example, solutions are obtained for separable potentials that contain a Davidson potential for the variable, for cases of γ-unstable nuclei, axially symmetric prolate deformed nuclei, and triaxial nuclei, implementing the usual approximations in each case, allowing mass parameter depend on the deformation. When this potential is used, it is enough to keep the interaction between rotation and vibration, instead of finding angular momentum dependent equilibrium values of β variable from the minimum condition of effective potential, in order to take into account a similar effect. This was done in [2], using different mass parameters for the rotation and vibration modes.

Excited state energies for the ground state band and reduced B($E2$) transition probabilities inside ground state band for depend on the same number of parameters which connect rotational, vibrational and single-particle states. Energy levels of ground state band built on $g_{7/2}$ orbital and B($E2$) values inside ground state band for Ta isotopes are calculated and compared with the available experimental data.

References

[1] R. V. Jolos and P. von Brentano, *Phys. Rev. C* **78** (2008) 064309.

[2] M. J. Ermamatov, P. C. Srivastava, P. R. Fraser, P. Stransky, and I. O. Morales, *Phys. Rev. C* **034307** (2012) 41.

[3] D. Bonatsos, P. E. Georgoudis, D. Lenis, N. Minkov, and C. Quesne, *Phys. Rev. C* **83** (2011) 044321.