

TEMPERATURE DEPENDENT SHAPE TRANSITION IN ^{188}Os

A. Ansari and B. K. Agrawal

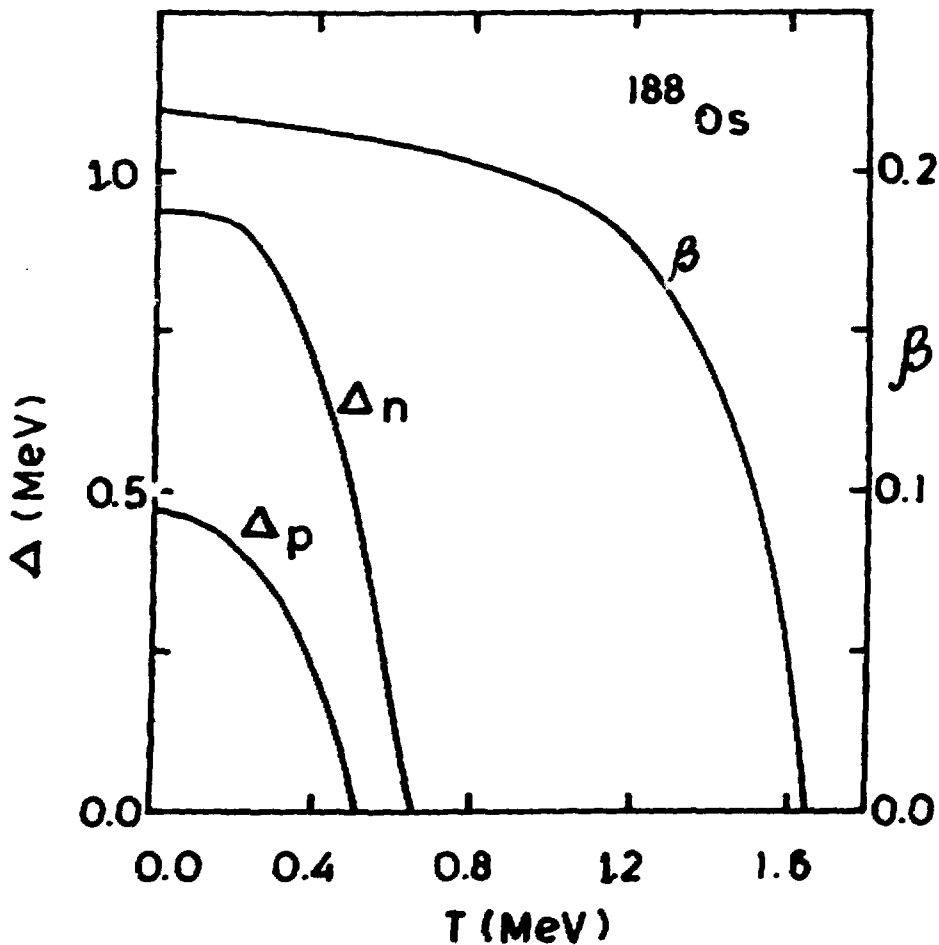
Institute Of Physics, Bhubaneswar-751005, India

The main structural features of rotational nuclei is more or less understood for the yrast states. Therefore, the interest is now shifting to the study of structure of hot rotating nuclei away from the yrast line where level densities are high.

In the present work we have performed a self-consistent temperature dependent Hartree-Fock-Bogoliubov(HFB) calculation¹ for ^{188}Os to study the effect of temperature on its intrinsic shape parameters. This nucleus has been studied in ref. 1 using a pairing plus quadrupole interaction Hamiltonian of Kumar and Baranger². As elsewhere³, we would like to point out here that in ref. 1 the set of spherical single particle(sp) energies used is not the correct one. A more appropriate set of sp energy for the Os-Pt region is given in ref. 4. The calculation carried out here is precisely like that in ref. 1 but with the spherical sp energies taken from ref. 4. As will be seen below this has significant consequences. The variation of quadrupole deformation parameter β and proton and neutron pairing gaps, Δ_p and Δ_n , respectively with temperature is displayed in the figure below. In ref. 1 the ground state ($T=0$) comes out to be triaxial with $\beta = 0.181$ and $\gamma = 22^\circ$. On the other hand, we get it axially symmetric with $\beta = 0.22$ and $\gamma = 0^\circ$. In ref. 1 the shape becomes oblate($\gamma = 60^\circ$) at $T=0.6$ MeV before becoming spherical at $T=1.3$ MeV, whereas in the present case it remains prolate throughout with the self-consistent value of γ becoming at most about 5° at $T=1.5-1.6$ MeV, till finally $\beta \rightarrow 0$. As usual pairing gaps vanish by $T \approx 0.4-0.6$ with a difference that for the lighter rare-earth nuclei Δ_n vanishes before Δ_p .

We would like to mention that our cranked HFB code is now modified to incorporate finite temperature($T \neq 0$) and calculations

for high-spin states are in progress. Our next plan is to include particle number projection and corrections for the β - γ shape fluctuations.



References

1. A. L. Goodman, Phys. Rev. C34 (1986) 1942
2. K. Kumar and M. Baranger, Nucl. Phys. A110 (1968) 529
3. A. Ansari, Phys. Rev. C38 (1988) 953
4. K. Kumar and M. Baranger, Nucl. Phys. A122 (1968) 273