TRIAXIAL SUPERDEFORMED BANDS AND WOBBLING IN $^{163}_{69}Tm^*$

X. Wang[a)], N.S. Pattabiraman[b)], U. Garg[a)], A.A. Afanasjev[a)], M.P. Carpenter[c)] R.S. Chakrawarthy[d)] S.S. Ghugre[b)], N.J. Hammond[c)] R.V.F. Janssens[c)], T. Li[a)], A.O. Macchiavelli[e)], E.F. Moore[c)] G. Mukherjee[c)] B.K. Nayak[a)], D. Seweryniak[c)] M. Whitehead[d)] and S. Zhu[a)]

[a)] *Physics Department, University of Notre Dame, Notre Dame, IN 46556*

[b)] *Inter University Consortium For DAE Facilities, Calcutta Center, Kolkata 700 098, India*

[c)] *Physics Division, Argonne National Laboratory, Argonne, IL 60439*

[d)] *Schuster Laboratory, University of Manchester, Manchester M13 9PL, UK*

[e)] *Nuclear Physics Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720*

Wobbling is a well predicted mode of rotational excitation unique to nuclei with stable triaxiality [1, 2, 3]. However, this mode had been experimentally identified only in three odd-A isotopes $^{163,165,167}_{71}$Lu [4, 5, 6]. We have investigated the Z = 69 nucleus ^{163}Tm using the reaction $^{130}Te(^{37}Cl, 4n)^{163}Tm$ with a beam energy of 170 MeV. Gamma-ray spectroscopy was performed using the Gammasphere array at LBNL and ANL. Two regular rotational bands with $\Delta E_\gamma \sim 60$ keV have been observed above the previously known 2626 keV, $31/2^-$ state. These are composed of Δ J = 2 transitions that, per fractional Doppler-shift measurements, have been found to be significantly faster than the low-lying transitions in the normal-deformed (ND) band. In addition, their identification as triaxial superdeformed (TSD) bands is based on a comparison with similar bands in the Lu and Hf nuclei, and with Cranked Nilsson-Strutinsky calculations that indicate the existence of triaxial superdeformed minima in this nucleus. These two TSD bands "talk" to each other and are highly suggestive of wobbling, evidence for which so far has been observed only in the Lu nuclei.

*Supported in part by the INDO-US, DST-NSF grant [DST/RPO-017/98 and NSF INT-0115336], the UK Science and Engineering Research council and the US Department of Energy, office of Nuclear Physics Division, under contract No W31-109-ENG-38.

[1] A. Bohr, B.R. Mottelson, Nuclear Structure, Benjamin, New York, 1975, Vol.II.

[2] I. Hamamoto, G.B. Hagemann, Phys. Rev. C **67**, 014319 (2003).

[3] R.F.Casten *et al.*, Phys. Rev. C **67**, 064306 (2003).

[4] D. R. Jensen *et al.*, Nucl. Phys. **A 703**, 3 (2002).

[5] G. Schonwasser *et al.*, Phys. Lett. **B 552**, 9(2003).

[6] H. Amro *et al.*, Phys. Lett. **B 553**, 197(2003).