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Unresolved γ-Rays in ^{114}Te

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In the last few years several efforts have been made to study the properties of the rotational motion in thermally excited nuclei. The important mechanism characterising the nuclear structure in this regime is the progressive mixing of rotational bands with increasing excitation energy, together with the onset of the damping of rotational motion. The emission of quasi-continuum γ-transitions with the energy up to 2 MeV is an experimental feature of the damped rotational motion and consequently the study of continuous spectra gives important insights into this problem.

Unresolved γ-transitions of ^{114}Te have been studied in the fusion reaction ^{64}Ni+^{54}Cr at bombarding energies 230, 240, 250, 260 and 270 MeV. The experiment was performed at Legnaro (Italy) and the γ-rays were detected by the EUROBALL array. One-dimensional and two-dimensional gated spectra were analysed.

The continuous E2-bump present in one-dimensional spectra in the 1400-2000 keV region (Fig. 1b) was studied as a function of bombarding energy and its fractional Doppler shift was deduced using the DSAM technique. Evidence for collective type of rotation was found. The values for the effective dynamical moment of inertia (Fig. 1a) were found to be almost constant in the interval I = 20-40 $\hbar$ and close to the rigid rotor value. This is in contrast to the smooth decrease observed in the moment of inertia of the resolved discrete bands characterised by the band termination effect.

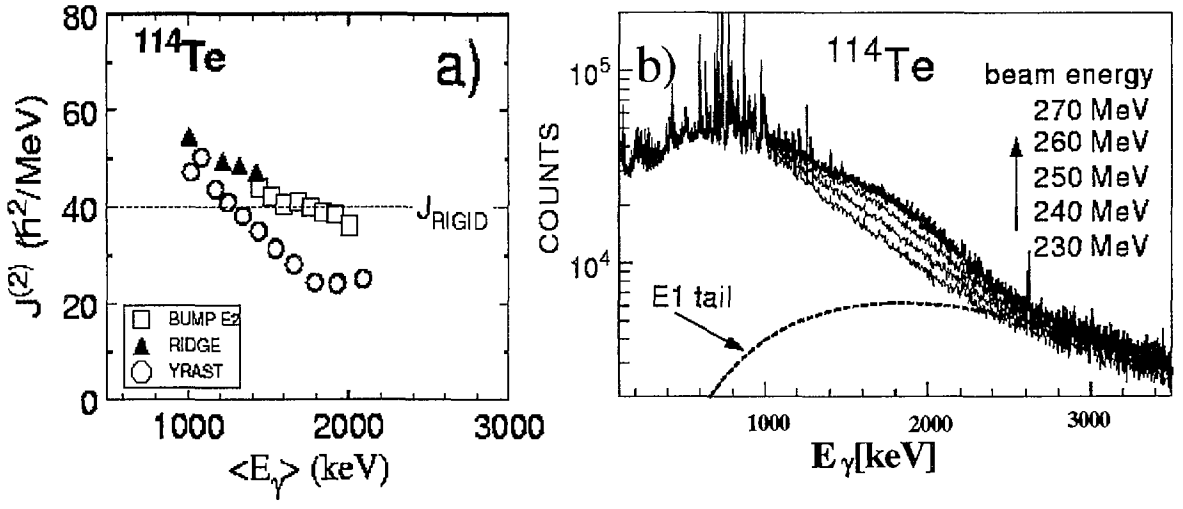

Fig. 1. a) The dynamical moment of inertia for ^{114}Te corresponding to the discrete yrast transitions (circles) and to the E2-bump (squares). b) The one dimensional γ-ray spectra measured at different bombarding energies in coincidence with low spin transitions of ^{114}Te, normalised to the number of counts associated with the measured average multiplicity.