

Extremes of nuclear structure

S B PATEL

Physics Department, University of Mumbai, Vidyanagari, Mumbai 400 098, India

Abstract. With the advent of medium and large gamma detector arrays, it is now possible to look at nuclear structure at high rotational forces. The role of pairing correlations and their eventual breakdown, along with the shell effects have showed us the interesting physics for nuclei at high spins – superdeformation, shape co-existence, yrast traps, alignments and their dramatic effects on nuclear structure and so on. Nuclear structure studies have recently become even more exciting, due to efforts and possibilities to reach nuclei far off from the stability valley. Coupling of gamma ray arrays with ‘filters’, like neutron wall, charged particle detector array, gamma ray total energy and multiplicity castles, conversion electron spectrometers etc gives a great handle to study nuclei produced online with ‘low’ cross-sections. Recently we studied, nuclei in mass region 80 using an array of 8 germanium detectors in conjunction with the recoil mass analyser, HIRA at the Nuclear Science Centre and, most unexpectedly came across the phenomenon of identical bands, with two quasi-particle difference. The discovery of magnetic rotation is another highlight. Our study of light In nucleus, ^{107}In brought us face to face with the ‘dipole’ bands. I plan to discuss some of these aspects. There is also an immensely important development — that of the ‘radioactive ion beams’. The availability of RIB, will probably very dramatically influence our ‘conventional’ concept of nuclear structure. The exotic shapes of these exotic nuclei and some of their expected properties will also be touched upon.

Keywords. Nuclear structure; high spin spectroscopy; gamma detector arrays.

PACS Nos 21.10.Tg; 23.20.Lv