

# Nuclear Structure and Octupole collectivity in $^{122}\text{Cs}$ Nucleus

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The nuclei which lie between the spherical ( $Z=50$ ) and the well deformed ( $Z=58$ ) region are of considerable interest because of the competing shape driving tendencies of the orbitals occupied by the neutrons and the protons. The proton Fermi level lies near the low- $\Omega$   $h_{11/2}$  orbitals, which favours the prolate nuclear shapes, while neutron Fermi level lies in the high to mid- $\Omega$   $h_{11/2}$  orbitals, which favours oblate nuclear shapes. Therefore, a variety of structures observed in this mass region are related to different shape driving forces due to the occupancy of the  $h_{11/2}$  orbitals for the valence protons and neutrons. The odd-odd nuclei in this mass region [1] exhibit some of the recently known phenomena of signature inversion and chiral symmetry [2]. In this mass region octupole collectivity has also been observed in  $^{114}\text{Xe}$  [3], since the proton and neutron orbitals,  $h_{11/2}$  and  $d_{5/2}$  ( $\Delta I=3$ ) are near the Fermi surface. The knowledge about the structure of the odd-odd nuclei in this region is still fragmentary because these nuclei have higher level densities leading to much more complex energy spectra than those of the even-even or odd-A nuclei.

We have studied the high spin states in  $^{122}\text{Cs}$  via  $^{107}\text{Ag}(^{19}\text{F}, p3n)^{122}\text{Cs}$  fusion evaporation reaction at beam energy of 93 MeV. Fifteen new transitions belonging to  $^{122}\text{Cs}$  have been observed and placed in the level scheme. The level structure of  $^{122}\text{Cs}$  has been extended up to  $E_x \approx 7$  MeV and  $J \approx 28\hbar$ . We have performed the linear polarization measurements using the Clover detectors to assign the unknown spins and parities of a few bands. We have also observed a few linking transitions between negative and positive parity bands indicating the octupole collectivity in this nucleus. One of the possible partner of the chiral band is also observed in this nucleus. The structures of the various bands are discussed in the frame work of the cranked Hartree-Fock-Bogoliubov model and the microscopic Projected Hartree-Fock model calculations.

## References:

- [1] B. Cederwall et al. Nucl. Phys. A542, (1992)454.
- [2] T. Koike, Phys. Rev. C67, 044319(2003).
- [3] G. de Angelis et al. Phys. Lett. 535B, 93(2002).