EXPLORING THE LIMITS OF CHIRALITY IN THE MASS A $\approx$ 130 REGION: THE ROLE OF THE PROTON-NEUTRON INTERACTION FOR FORMING CHIRAL GEOMETRY IN THE ODD-ODD NUCLEUS ^{132}Cs

G. Rainovski[a,b], E. S. Paul[a], H. J. Chantler[a], P. J. Nolan[a], D. B. Fossan[b], T. Koike[b], K. Starosta[b], C. Vaman[b], D. G. Jenkins[c], R. Wadsworth[c], P. Raddon[c], A. Simons[c], E. Farnea[d], A. Gadea[d], Th. Kröll[d], G. de Angelis[d], R. Isocrate[e], D. Curien[f], and V. I. Dimitrov[g]

[a] *Oliver Lodge Laboratory, University of Liverpool, Liverpool L69 7ZE, United Kingdom*
[b] *Department of Physics and Astronomy, SUNY at Stony Brook, Stony Brook, New York 11794-3800*
[c] *Department of Physics, University of York, Heslington, York Y01 5DD, United Kingdom*
[d] *INFN, Laboratory Nazioanly di Legnaro, Legnaro I-35020, Italy*
[e] *INFN, Sezione di Padova, Padova I-35131, Italy*
[f] *Institut de Recherches Subatomiques, Strasbourg, F67037, France*
[g] *University of Notre Dame, Notre Dame, Indiana 46556*

High-spin states in the doubly odd $N = 77$ nucleus ^{132}Cs have been studied. Gamma-ray linear polarization and angular correlation measurements have been performed to determine the spin and parity of the states. A new band, which can be understood as chiral partner of the $\pi h_{11/2} \otimes \nu h_{11/2}$ band has been observed. The 3D TAC model calculations [1] have shown that these bands can be associated with an aplanar solution for the $\pi h_{11/2} \otimes \nu h_{11/2}$ configuration at $\gamma = 36^\circ$ and $\varepsilon_2 = 0.16$. However, due to the moderate quadrupole deformation the chiral structure becomes unstable.

One of the most important fingerprints for chirality is the typical behavior of the $B(M1; I \rightarrow I-1)/B(E2; I \rightarrow I-2)$ ratios in the main band and $B(M1; I \rightarrow I-1)_{in}/B(M1; I \rightarrow I-1)_{out}$ ratios in the side band [2]. In order to reproduce the experimentally observed ratios in the chiral partners we have performed Core-Particle-Coupling model (CPCM) calculations [3]. In the current study the deformation parameters from the 3D TAC calculations were used as input parameters for the CPCM calculations. In the previous implementations of the CPCM [2,3] only a quadrupole-quadrupole interaction between the valence particles was considered. In the case of ^{132}Cs, it turned out that due to the smaller quadrupole deformation the chiral bands can be described only if a more realistic interaction between the valence particles is included. For this purpose we introduce in the CPCM the surface delta interaction between the valence particles [4]. The calculations have reproduced both the magnitude and the staggering in the experimental ratios. The observed staggering is a direct consequence from the restrictions imposed on the wave functions by the chiral arrangement [2]. The good agreement between experiment and theory (CPCM calculations) unambiguously show the important role of the proton-neutron interaction between the valence particles for forming chiral geometry.

[1] V. I. Dimitrov, S. Frauendorf, F. Dönau, Phys. Rev. Lett. **84**, 5732 (2000).
[2] T. Koike *et al.*, Phys. Rev. **67**, 044319 (2003).
[3] K. Starosta *et al.*, Phys. Rev. C **65**, 044328 (2002).
[4] N. Tajima, Nucl. Phys. **A572**, 365 (1994).