

3 - 4 Candidate Revolving Chiral Doublet Bands in $^{119}\text{Cs}^*$

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The chiral bands built on a configuration with only protons in the transient backbending regime was also observed for the first time in ^{119}Cs ^[1]. One newly observed band (Band 9) which is nearly degenerate to the strongly-coupled $g_{9/2}[404]9/2^+$ band of ^{119}Cs was identified. It exhibits a backbending similar to that of known band (Band 8), at nearly constant rotation frequency. Tilted axis cranking covariant density functional theory with pairing correlations and PNC-CSM calculations show that the backbending is induced by the rotational alignment of two $h_{11/2}$ protons, whose angular momenta reorient from the short to the intermediate axis, in a plane orthogonal to the angular momentum of the strongly-coupled $g_{9/2}$ proton which keeps aligned along the long axis. Figure 1 shows that the total spin points in 3D, inducing the breaking of the chiral symmetry and giving rise to nearly degenerate doublet bands. We can conclude that the chirality in nuclei is a general phenomenon, being robust and present not only in a two-component quantum many-body system, but also in a one-component quantum many-body system as well.

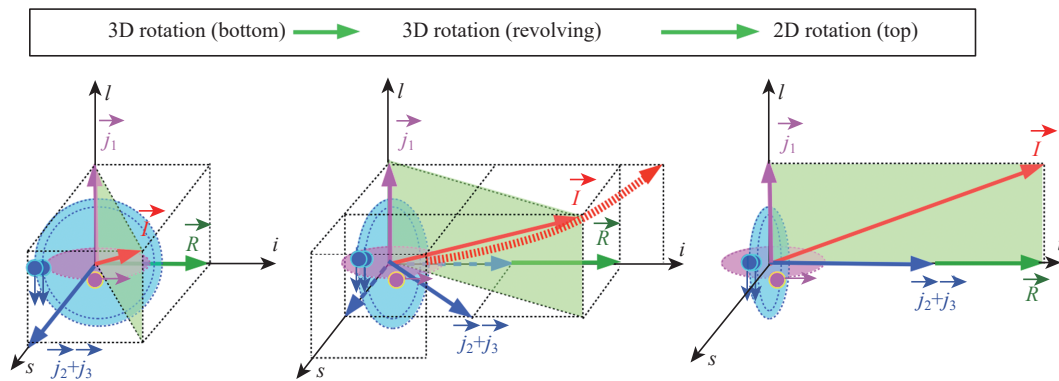


Fig. 1 (color online) Sketch of the coupling of angular momenta in Bands 8 and 9 of ^{119}Cs . The angular momenta of the strongly-coupled proton j_1 , of the two $h_{11/2}$ protons $j_2 + j_3$ revolving from the short to the intermediate axis, and of the core R along the intermediate axis, couple to the total spin I out of the principal planes, which consequently revolves in 3D towards the intermediate axis in the backbending region, finally ending in the long-intermediate plane. The nearly degenerate Bands 8 and 9 correspond to the drawn angular momenta and their mirror images in the $s-l$ plane, obtained by inverting the core angular momentum R .

Reference

- [1] K. K. Zheng, The European Physical Journal A, 59(2022)50.

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3 - 5 Charge Dependence of an Inferred Isomer in $^{92}\text{Zr}^*$

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The influence of the electronic environment on nuclear decay has been proposed for long time^[1]. The lifetime of some excited states of nucleus may change due to the influence of electron wave function. A typical example is a 20% reduction in the half-life of an isomer of ^{57}Fe affected by the charge state^[2]. By blocking the internal conversion

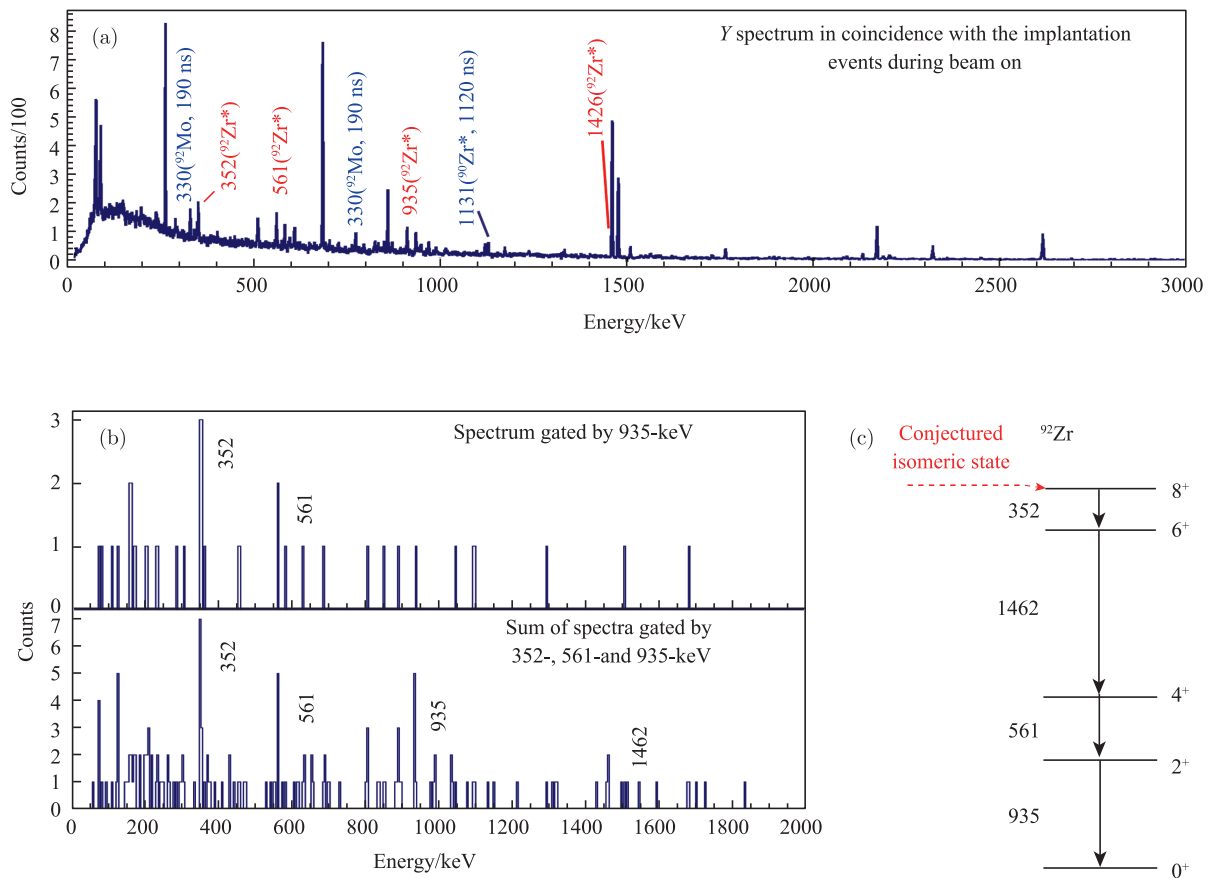


Fig. 1 (color online) (a) The γ -spectrum in coincidence with implantation events, (b) Gated spectra showing the coincidence of the 935-, 561-, 1462-, and 352-keV transitions, (c) Partial level scheme of ^{92}Zr known experimentally is presented, and also the conjectured isomer is indicated.