SPHERICAL AND DEFORMED STRUCTURES IN ^{189}Pb*

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In the high-spin states of the neutron-deficient isotopes of lead, prolate-deformed structures have been identified in the even-mass isotopes with $A \leq 190$, competing with the spherical and oblate structures seen at higher masses. In particular, a detailed study of triple shape coexistence in ^{188}Pb has recently been reported by Dracoulis et al. [1]. These observations are consistent with the predictions of theoretical calculations (e.g., [2,3]) that the prolate band should become yrast near mid-shell ($N \approx 104$) for $J > 4$ in the even-mass isotopes.

In the odd-mass Pb isotopes, extensive investigations of the high-spin states of the isotopes with $A \geq 191$ have not yielded evidence for prolate deformation (apart from the superdeformed band in ^{193}Pb reported by Hughes et al. [4]). Based on observations in the even-mass isotopes, one might expect to see evidence of prolate deformation in the odd-mass isotopes for $A \leq 189$. However, in a recent study of ^{187}Pb [5] only a single band of levels was observed and this could be attributed to the weak coupling of the odd $i_{13/2}$ neutron to states in the spherical well. In the odd-mass isotopes the manifestation of prolate deformation is not likely to be such simple weak coupling; rather, it may be more like the strongly-coupled prolate bands observed in the odd-mass mercury isotopes with $A \leq 187$.

We have carried out a spectroscopic study of the high-spin states of ^{189}Pb using a variety of techniques. These include:
• in-beam γ-γ spectroscopy with mass selection of the evaporation residues to positively assign the observed radiation to ^{189}Pb;
• identification of a 32-μsec isomer by delayed γ-ray measurements with pulsed beams; and
• establishment of the level scheme below this isomer by γ-γ spectroscopy, also with a pulsed beam.

These results will be presented and interpreted in terms of structures involving coexisting spherical, oblate and prolate shapes.

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