

“Superdeformed” bands in ^{80}Sr

M. Devlin¹, D.R. LaFosse¹, C. Baktash², I. Birriel⁴, M.J. Brinkman², H.-Q. Jin², I.Y. Lee⁵, F. Lerma¹,
A.O. Macchiavelli⁵, D. Rudolph², J.X. Saladin⁴, D.G. Sarantites¹, G.N. Sylvan³, S.L. Tabor³,
D.F. Winchell⁴, V.Q. Wood⁴, and C.-H. Yu²

¹ *Chemistry Department, Washington University, Saint Louis, MO 63130*

² *Physics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831*

³ *Department of Physics, Florida State University, Tallahassee, FL 32306*

⁴ *Department of Physics, University of Pittsburgh, Pittsburgh, PA 15260*

⁵ *Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720*

Superdeformed bands have been observed in numerous nuclei in the mass 80 region in recent years. The lightest of these nuclei is ^{80}Sr , for which we report here the observation of four high-spin collective bands.

The nucleus ^{80}Sr was populated by the reaction $^{58}\text{Ni}(^{28}\text{Si},\alpha 2p)$ at $E_{\text{lab}} = 130$ MeV, and GAMMAS-PHERE with 57 detectors was used to detect γ -rays in triple or higher coincidence. The MICROBALL, an array of 95 CsI detectors, was used to select charged-particle exit channels. The γ -rays were doppler corrected using the recoil momentum reconstructed from the observed evaporation products, in order to obtain the best possible γ energy resolution.

Figure 1 shows the four observed SD bands, double-gated on all of the transitions (marked by asterisks) in the bands. The observed coincident evaporation particles and low-spin γ -rays indicate that all of these bands are in ^{80}Sr , though no connecting transitions have been established. Further, band 3 appears to decay into band 2, and band 2 splits at higher spins. The dynamic moments of inertia of all the bands are approximately $24 \hbar^2/\text{MeV}$.

Lifetime measurements of the two strongest bands were made using the centroid-shift method, and average transition quadrupole moments (Q_t) were extracted. These bands appear to be considerably less deformed than SD bands in other Sr isotopes.¹ Figure 2 shows the extracted average Q_t values for the yrast SD bands in Sr isotopes, as well as that for the ground bands at low spin.² As can be seen, the deformation of the yrast SD band in ^{80}Sr is significantly less than that in the other Sr isotopes, and is approximately equal to that of its normal deformed ground band at low spin. The structure of these bands and the origin of their reduced Q_t values will be discussed.

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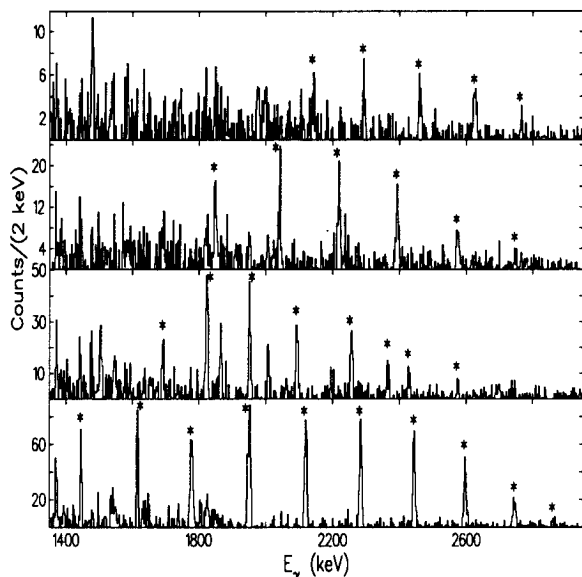


FIG. 1. SD bands 1 (bottom) to 4 (top) observed in ^{80}Sr .

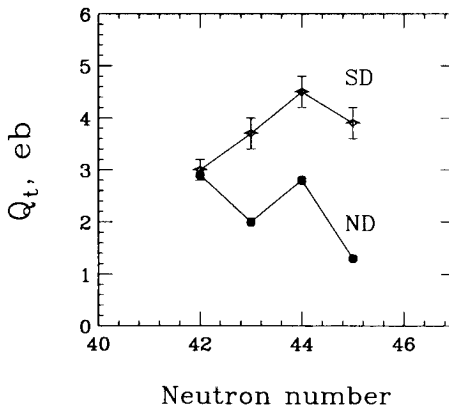


FIG. 2. Average Q_t values for SD and low-spin normal deformed yrast bands in Sr isotopes.

¹D.R. LaFosse, et al., Phys. Lett. **B 354** (1995) 34; C. Baktash, et al., Phys. Rev. Lett. **74** (1995) 1946; F. Cristancho, et al., Phys. Lett. **B 357** (1995) 281; A.G. Smith, et al., Phys. Lett. **B 355** (1995) 32; and C.-H. Yu, et al., these proceedings.

²S.L. Tabor, et al., Phys. Rev. **C49** (1994) 730