

# SUPERDEFORMED BANDS IN $^{80-83}\text{Sr}$ , $^{82-84}\text{Y}$ , AND $^{83,84}\text{Zr}$ : TRANSITION QUADRUPOLE MOMENTS, MOMENTS OF INERTIA, AND CONFIGURATION ASSIGNMENTS\*

W. Reviol<sup>1</sup>, F. Lerma<sup>1</sup>, D.G. Sarantites<sup>1</sup>, M. Devlin<sup>1</sup>, D.R. LaFosse<sup>1</sup>, R. Wyss<sup>2</sup>, C. Baktash<sup>3</sup>, H.-Q. Jin<sup>3</sup>, S.L. Tabor<sup>4</sup>, D. Soltysik<sup>4</sup>, R.M. Clark<sup>5</sup>, I.Y. Lee<sup>5</sup>, A.O. Macchiavelli<sup>5</sup>, R.W. MacLeod<sup>5</sup>

<sup>1</sup> Chemistry Department, Washington University, St. Louis, MO 63130, USA

<sup>2</sup> KTH, Department of Physics-Frescati, Frescativ. 24, S-104 05 Stockholm, Sweden

<sup>3</sup> Physics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830, USA

<sup>4</sup> Department of Physics, Florida State University, Tallahassee, FL 32306, USA

<sup>5</sup> Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA

In the mass 80 region, 40 superdeformed (SD) bands in 15 different nuclei have been identified. These bands are observed up to a rotational frequency of about 1.3 MeV, a value twice as high as the maximum frequencies encountered for the SD bands in next heavier region of SD shapes around mass 150. Therefore, the study of the properties of these SD bands remains a challenging task.

The data under discussion are from a “backed-target” experiment using the 130 MeV  $^{28}\text{Si} + ^{58}\text{Ni}$  and  $^{29}\text{Si} + ^{58}\text{Ni}$  reactions and the Gammasphere and Microball  $4\pi$  detector arrays. Some but not all results obtained in this experiment have been reported in Ref. [1]. Here we present the complete information obtained: the properties of 20 SD bands in the nuclei  $^{80-83}\text{Sr}$ ,  $^{82-84}\text{Y}$ , and  $^{83,84}\text{Zr}$ . Among these SD bands are 7 bands newly observed or reported in detail for the first time. Most importantly, for 15 of these SD bands an average transition quadrupole moments ( $Q_t$ ) could be accurately measured.

The significance of these data is the coverage of a large fraction of the mass 80 island of superdeformation including its doubly magic nucleus  $^{84}\text{Zr}$ . This allows for a systematic study of the island. Combining the experimental findings with theoretical calculations of the Woods-Saxon Strutinsky type, the following issues will be discussed:

- Trends of the  $Q_t$  moments: changes of the  $Q_t$ 's of the yrast SD bands as a function of proton and neutron number and comparisons between the  $Q_t$ 's of some excited and the corresponding yrast SD bands.
- $J^{(2)}$  moments of inertia: low-frequency band interactions at high-frequency rotational alignments.
- Isospectral SD bands in  $^{82,83}\text{Sr}$  and  $^{83,84}\text{Y}$ : near identity of the  $Q_t$  moments.
- “Singularities”: band interaction between SD bands in  $^{81}\text{Sr}$ .

From this discussion, configuration assignments for all SD bands in  $^{80-83}\text{Sr}$ ,  $^{82-84}\text{Y}$ , and  $^{83,84}\text{Zr}$  are proposed and some of the previously made assignments (except those in Ref. [1]) are revised. The assignments for different SD bands have in common that one or more nucleons occupy the  $N=5$   $h_{11/2}$  intruder orbital and substantiate the picture that  $^{84}\text{Zr}$  is the “central” SD nucleus in the region.

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1. F. Lerma *et al.*, Phys. Rev. Lett. **83** (1999) 5447.