

The Microball and Gammasphere: Research highlights and future promise

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The Microball is a 95 element array of CsI detectors designed as an exit channel and particle spectroscopy device to be used in conjunction with Gammasphere. It has been used in over a dozen physics experiments, and many more are planned. The topics addressed by these studies include superdeformation in the $A = 80$ region, reaction mechanism studies of the population of superdeformed bands, spectroscopy of $N = Z$ nuclei, identification of new SD bands in Eu, Tb and Sm isotopes, investigations of identical bands in $A = 150$ and 80 nuclei, investigations of $\Delta I = 4$ staggering, studies of the decay out of SD bands in Eu, and searches for hyperdeformation in Gd and Sm isotopes. As an example of the capabilities of the Microball, the figure below shows the improvement in resolving power obtained with the Microball in the case of the yrast superdeformed band in ^{80}Sr .

After a brief summary of the design, operation and capabilities of the Microball, some highlights of the results from these projects will be discussed. Particular emphasis will be placed on studies of superdeformation in the $A = 80$ region and studies of the population mechanisms of normal and SD states. Recent results include a study of the evolution of deformation of SD states as a function of neutron number in the Sr isotopes, and the determination of entry-state excitation-energy distributions for normal and superdeformed states in ^{82}Sr .

Future directions and projects will be discussed, including plans for the next generation particle ball (the "Nanoball").

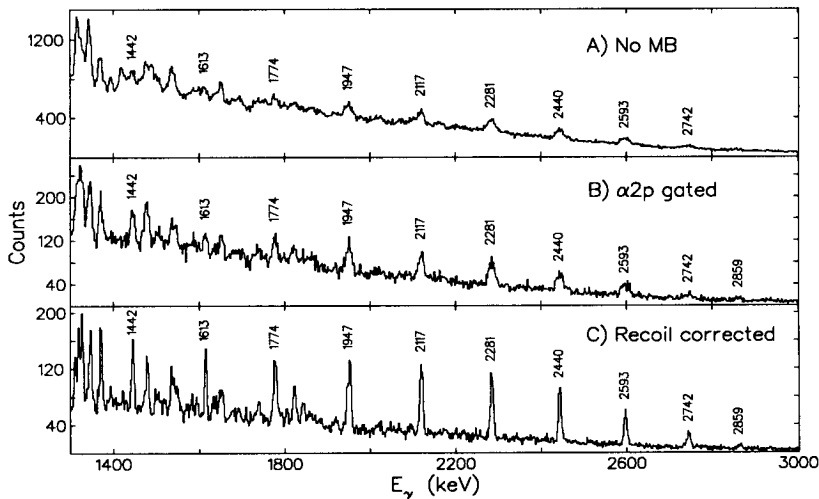


FIG. 1. Yrast superdeformed band in ^{80}Sr , double-gated on the labeled lines, A) without exit channel selection, B) with the $\alpha 2p$ channel selected, and C) with the recoil-momentum residual Doppler shift correction applied.