THE NUCLEAR STRUCTURE OF ^{235}U*

D. Ward[1], R. M. Clark[1], D. Cline[2], M. Cromaz[1], M. A. Deleplanque[1], R. M. Diamond[1]
P. Fallon[1], G. J. Lane[1,3], I. Y. Lee[1], A. Goergen[1,4], A. B. Hayes[2], A. O. Macchiavelli[1],
T. Nakatsukasa[5], R. Teng[2], F. S. Stephens[1], C. E. Svensson[1,6], K. Vetter[1,7], and C-Y Wu[2]
[1]*Lawrence Berkeley National Laboratory, 1 Cyclotron Rd, Berkeley CA 94720, USA*
[2]*University of Rochester, Rochester, NY*
[3]*Australian National University, Canberra, Australia*
[4]*CEA Saclay, F-91191 Gif-sur-Yvette, France*
[5]*University of Tsukuba, Tsukuba 305-8571, Japan*
[6]*University of Guelph, Guelph, Ontario N1G2W1, Canada*
[7]*Lawrence Livermore National Laboratory, Livermore, CA 94550, USA*

We will report on the outcome of three separate experiments performed at LBNL's 88-Inch Cyclotron over a period of several years in which ^{235}U (thick target) was Coulomb-excited. It involved stand-alone experiments with Gammasphere and with the 8PI Spectrometer using ^{136}Xe beams at 720 MeV, and a CHICO-Gammasphere experiment with an ^{40}Ar beam at 180 MeV. In addition to extending the negative-parity bands to high spin, we have assigned levels in some seven positive parity bands which are in some cases (e.g. [631]1/2, and [622]5/2) strongly populated by E3 excitation. The CHICO data has been analysed to extract E2, and E3 matrix elements from the observed yields. Additionally, many E1 and M1 matrix elements could be extracted from the gamma-ray branching ratios.

One theme being pursued is the damping of the Coriolis interaction amongst the members of the $j_{15/2}$ multiplet. This has been a long-standing problem. The octupole correlations, which are very strong in ^{235}U, may be responsible for the effect, since they dilute the high-j components of the $j_{15/2}$ wavefunctions, spreading them over the positive-parity levels. We have now sufficient data to test this hypothesis quantitatively. At increasing spins the effects of the Coriolis interaction on the $K=5/2^-$ member of the multiplet is weakening, as shown in the left hand panel of the figure below. A second problem concerns the relationship of the energy decoupling factor a, (a=-0.29) and the magnetic decoupling factor b, (b=0.49) for the [631]1/2 band. The Nilsson model for the observed deformation (ε_2=0.25) reproduces the observed a-value, but not the b-value, which is predicted to be near zero (shown below in the right panel). Ways in which this may also be related to E3 correlations will be presented.

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