Evolution of Collectivity with Spin in $^{70}$As

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The most recent work concerning $^{70}$As extended the level scheme by discovering many new transitions, but found no contiguous negative-parity, odd-spin band (Fig. 3). Such a band exists in nearby odd-$^{68}$As (Fig. 4) and $^{72}$As (Fig. 5), so it is surprising that it would be missing from $^{70}$As.

In this research, we sought to enhance the $^{70}$As level scheme and compare it with those of $^{68}$As and $^{72}$As.

The new band (3) is added and is the odd-spin, negative-parity partner to the previously discovered even-spin, negative-parity band. This trait more closely matches the level scheme of nearby $^{68}$As.

Figure 8 is an example of one of the coincidence spectra analyzed in this project. In this spectrum, the new transitions, 548 and 566 keV, are clear.

The trend of excited-state energies of the positive parity band in $^{70}$As very nearly follow the trend expected for rotation of a rigid body ($\varepsilon \sim \beta J$). Thus $^{70}$As is dominated by collective behavior at high spin, likely initiated by the occupation of the $g_{5/2}$ orbital by the unpaired proton and neutron.

The energy differences of several nearby odd-odd nuclei are higher at even states at spin greater than about 10, but higher at odd states before at spin below 10.

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