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The structure of excited states seen in double beta decay

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Abstract content
 (Max 300 words)

There are only two nuclei in which double beta decay to excited states in nuclei have been measured. Namely, $100\text{Mo} \rightarrow 100\text{Ru}$ first excited 02^+ state and the $150\text{Nd} \rightarrow 150\text{Sm}$ first excited 02^+ state. These are very useful in giving information about the nature of the neutrino (Dirac or Majorana) and the ordering of the masses. There is not enough knowledge on the microscopic structure of the 01^+ and 02^+ in 150Sm . We have studied the detailed spectroscopy of 150Sm and 152Gd isotones using the AFRODITE and JUROGAM spectrometer arrays following (α, xn) reactions. We observe very intense E1 transitions between the excited $K\pi = 02^+$ bands and the lowest negative parity bands in both nuclei. With recent questioning of the nature of collective beta vibrations in $N=88$ and 90 nuclei, it is clear that understanding the microscopic detail of the structure of these states in nuclei in this range is most crucial. We think that exploring E1 transitions between bands could prove to be a very powerful tool in understanding the structure of negative-parity bands and their relationship to positive-parity bands. Directional Correlations from Oriented states (DCO), Polarization Anisotropy, Branching ratios and $B(E1)$ strengths for these new E1 transitions found will be presented.

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