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Beta-delayed Neutron spectroscopy of Ga isotopes beyond the N=50 shell closure

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The study of beta-decay properties close to the doubly magic 78Ni has recently been spurred by the availability of new species at fragmentation and ISOL type facilities. The observation of faster-than-expected decay half-lives [1-3] and large neutron emission probabilities [4,5] suggests an important role of nuclear structure far away from stability. In order to understand the role of nuclear structure in the decay one has to move away from integrated properties such as the half-life and measure the decay strength in detail. Of course, in neutron rich regions far away from stability a substantial fraction of the decay strength will populate neutron unbound states.

The neutron time-of-flight spectrometer, VANDLE, was developed at Oak Ridge National Laboratory as a high efficient modular array of plastic scintillators for decay and reaction studies [6]. Here we present results from the study of the beta-decay of the A=83,84 isotopes of Gallium. In both cases half of the neutron emission is unexpectedly observed at energies higher than 2 MeV. The large emission energy indicate the neutron emission is dominated by the decay from neutrons deep across the N=50 gap.

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