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The Heisenberg Pentamer: Understanding the inelastic neutron scattering selection rules for magnetic clusters JASON HARALDSEN, Los Alamos National Laboratory — Assuming Heisenberg interactions and the symmetric case of a spin S-S' pentamer, the energy eigenstates can be determined exactly. With the energies known, the inelastic neutron scattering intensities are then calculated for the special case of a 1-1/2 pentamer. Through an analysis of these results, two main insights are gained. (1) Because of symmetry constraints, not all $\Delta S_{tot} = \pm 1$ transitions are accessible by inelastic neutron scattering (INS). This constrains the standard selection rules for magnetic excitations. (2) The INS signatures of magnetic clusters are directly dependent on the state and component that is excited.

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