

# Testing Shell Model parameters: single-particle states in $^{133}\text{Sn}$ below AND above the neutron separation energy from the $^9\text{Be}$ ( $^{132}\text{Sn}, ^8\text{Be}$ ) reaction

- Gamma-ray detection offers much better energies than particle detection using inverse kinematics
- Coincidence pattern helps establish spins
- Identified  $1h_{9/2}$  and probably  $1i_{13/2}$  state
- May not be enough statistics to confirm E3 character of transition from  $1i_{13/2}$  state to ground state
- Coincidence spectra show lowest 2 transitions are in coincidence
- Subbarrier transfer measures asymptotic normalization coefficients (ANC) to determine spectroscopic factors
- Important input to spectroscopic factor determination

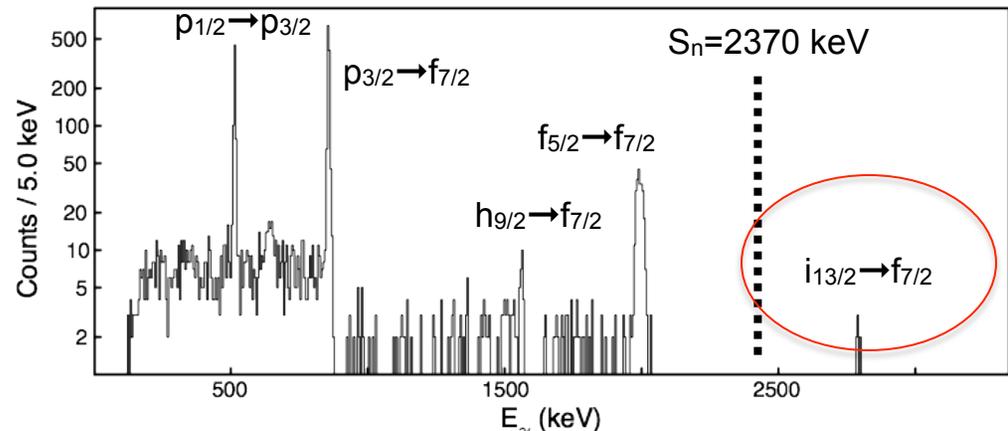
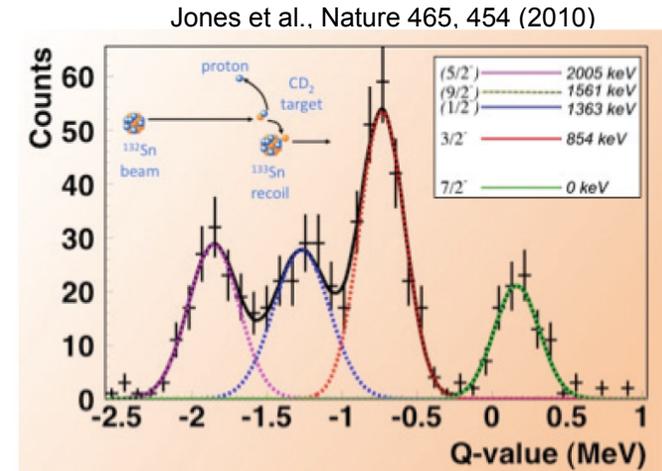
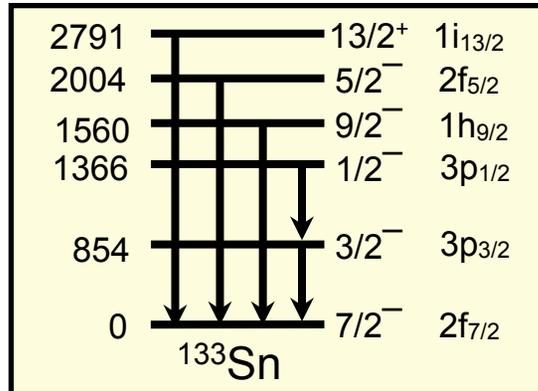


Figure: (Top) Q-value spectrum derived from the  $^{132}\text{Sn}(d,p)$  reaction in inverse kinematics (Jones et al.). (Bottom left) The energy levels in  $^{133}\text{Sn}$  as observed in the sub-barrier transfer reaction  $^{132}\text{Sn}(^9\text{Be}, ^8\text{Be})^{133}\text{Sn}$ . (Bottom right) Gamma-ray spectrum taken in coincidence with two alphas from the break-up of  $^8\text{Be}$ . The width of the  $f_{5/2} \rightarrow f_{7/2}$  transition suggests that the state is short lived and the gamma-ray is emitted in the target.

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