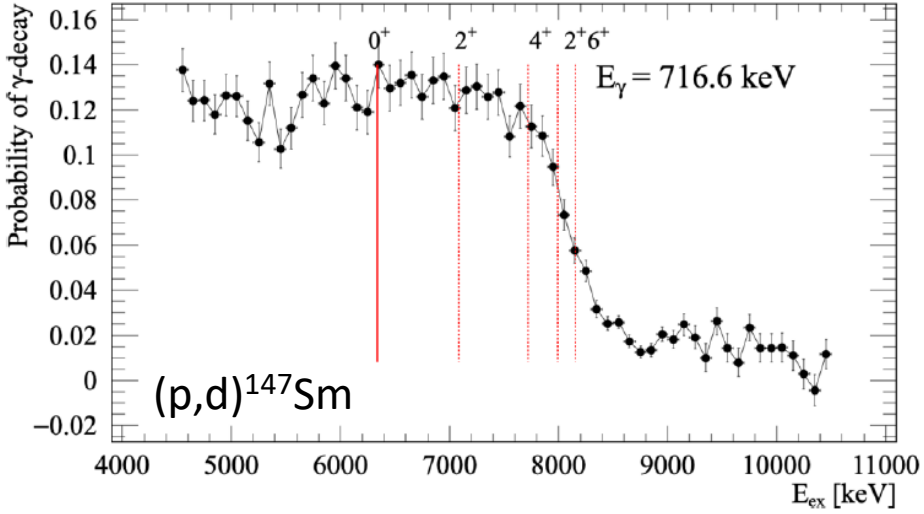
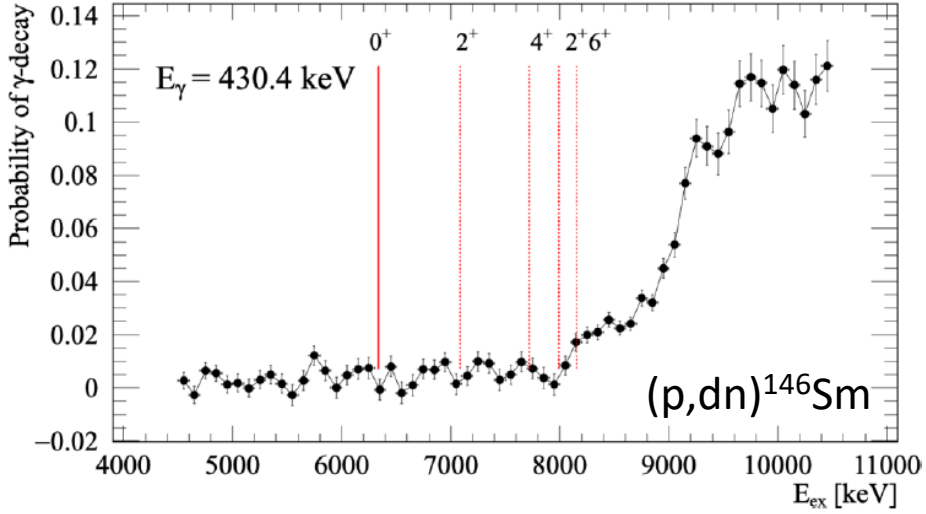
Spin inhibition in γ-decay probabilities for states above S_n in Sm and Dy nuclei

Spin inhibition is the effect where a system is blocked from decay via neutron emission due to angular momentum conservation. If the excited nucleus is in a high-spin state, but does not have enough excitation energy to conserve angular momentum by either photon emission after neutron emission or relative angular momentum carried off by the neutron, the nucleus cannot undergo de-excitation through the neutron emission channel. Thus the de-excitation proceeds via γ-ray emission. Thus, the competition between neutron and γ -ray emission from high-spin states above the S_n carries information about the structure of the compound nucleus formed during the reaction and is key for the correct description of the system, for example in the surrogate method approach.

The figures show the γ emission (716 keV) from a $(11/2)^-$ state in ^{147}Sm that continues above the S_n until the 6^+ state in ^{146}Sm is energetically accessible (observed as 430keV γ ray emission from ^{146}Sm). At this point, neutron emission is open and the γ-emission probability begins to decrease.





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