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Study of the ^{129}Sn structure by beta decay: On the nature of the $3/2^+$ ground state and $1/2^+$ 315.3-keV level

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We have investigated levels in ^{129}Sn populated from the β^- decay of ^{129}In isomers at the ISOLDE facility.
The ^{129}Sn nucleus is a three-neutron hole system next to the doubly magic ^{132}Sn.
The involved states of spin $1/2^+$ and $3/2^+$ are expected to have a configuration determined by the neutron $s_{1/2}$ and $d_{3/2}$ single particle states, respectively. Consequently, these states should be connected by a rather slow l-forbidden M1 transition.
Using the fast timing technique we have measured the lifetime of the $1/2^+$ 315.3-keV level and determined the transition rate for the 315.3-keV γ-ray feeding the $3/2^+$ ground state.
Our measurement shows a moderately fast M1 transition with a very weak,
if any, E2 component.
The previously reported level schemes in ^{129}Sn were mostly confirmed by the $\gamma - \gamma$ coincidences. This study represents the first test of the ISOLDE Decay Station (IDS).

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