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γ emission from neutron-unbound states in 133Sn

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The study of 133Sn provides excellent conditions to investigate single-particle transitions relevant in the neutron-rich 132Sn region due to the simplicity of its nuclear structure. After many experimental activities employing one-neutron transfer reactions [1–4], traditional β-decay studies are an attractive technique to refine our knowledge on 133Sn. Since the positions of neutron single-particle states in 133Sn were established and confirmed in many measurements [1–5], our focus moves to single-hole states expected at higher excitation energies. Because of the low neutron-separation energy of 133Sn, Sn=2.4 MeV [6], all of them are supposed to be neutron-unbound. β-decay studies are therefore a natural choice to investigate their nature since there is a large energy window for their population in the β decay of 133In (Q_β =13.4(2) MeV [6]).

Our experiment was performed at the ISOLDE Decay Station, where excited states in 133Sn were investigated via the β decay of 133In. Isomer-selective ionization using the ISOLDE RILIS enabled the β decays of 133gIn (Iπ =9/2+) and 133mIn (Iπ=1/2−) to be studied independently for the first time. Thanks to the large spin difference of those two β-decaying states, it is possible to investigate separately the lower- and higher-spin states in the daughter 133Sn and thus to probe independently different single-particle and single-hole levels. We identified new γ transitions following the 133In→133Sn decay. Single-hole states in 133Sn were found at energies exceeding S_n up to 3.7 MeV [7]. Due to centrifugal barrier hindering the neutron from leaving the nucleus, the contribution of electromagnetic decay of those unbound states was found to be significant.

[1] K. L. Jones et al., Nature (London) 465, 454 (2010).
[2] K. L. Jones et al., Phys. Rev. C 84, 034601 (2011).
[3] J. M. Allmond et al., Phys. Rev. Lett. 112, 172701 (2014).
[4] V. Vaquero et al., Phys. Rev. Lett. 118, 202502 (2017).
[5] P. Hoff et al., Phys. Rev. Lett. 77, 1020 (1996).
[6] M. Wang et al., Chin. Phys. C 41, 030003 (2017).
[7] M. Piersa et al., Phys. Rev. C 99, 024304 (2019).

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