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Beta-decay study on the neutron-unbound states in 133Sn at ISOLDE Decay Station ZHENGYU XU, MIGUEL MADURGA, ROBERT GRZYWACZ, University of Tennessee, THE IS632 COLLABORATION — In this contribution, we will present a recent experimental work studying the neutron-unbound states in 133Sn from the beta decay of 133In at ISOLDE Decay Station. The beta decay in this region ($Z < 50$ and $N > 82$) is characterized by a large beta-decay energy window Q_β and low neutron separation energy Sn. Due to the valence proton and neutron orbitals having opposite parities, Gamow-Teller transitions create deep-neutron holes in the 132Sn core. The large N=82 shell gap makes these neutron-hole states in 133Sn neutron unbound. The neutron time-of-flight detector VANDLE was used to identify these states for the first time. Neutron resonances were observed at energies between 1.5 and 3.7 MeV corresponding to candidate 11/2- (h11/2), 3/2+ (d3/2), 1/2+ (s1/2), and 7/2+ (g7/2). The neutron h11/2 state had been previously identified in gamma-ray spectroscopy, suggesting a strong suppression of the neutron emission channel. In this experiment, for the first time in the 132Sn region, it was possible to observe the neutron emission from a gamma-decaying state, thus allowing to establish partial decay widths for the gamma and neutron channels. Partial decay widths can be useful to calculate (n,γ) capture rates for rapid neutron capture (r-process) abundance calculations.

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