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Beta-Delayed Neutron-Emission Probabilities of 20 neutron-rich Ag, Cd, In and Sn isotopes: Impacts on the second r-process peak formation

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Nuclear physics imprints on the r-process nucleosynthesis manifest themself in the so-called r-process peaks. In particular, the second r-process peak around mass number A=130 is thought to be formed robustly by the accumulation of nuclear matter along the neutron magic number N=82, due to the nuclear closed-shell effect. Therefore, experimental data on nuclear properties in this nuclear region will provide important constraints for a better understanding of the formation of the peak. Using the BRIKEN setup at RIKEN, the β-delayed one- and two-neutron branching ratios (P_{1n} and P_{2n} values) of 20 neutron-rich nuclei $^{129-131}$Ag, $^{131-134}$Cd, $^{132-136}$In, and $^{134-138}$Sn has been measured. Our results offer, for the first time, a systematic picture of the evolution of (P_{1n} and P_{2n} values crossing the N=82 and Z=50 shell closure in daughter nuclei, and provide stringent benchmarks for the newly developed global theoretical calculations of β-decay properties. The impact of measured P_{1n} and P_{2n} values on the formation of the second r-process peak has been studied. It was found that it is significant in shaping odd-even abundance pattern and it directly contributes to the β-decay flowing to the stable isotopes of Te and Cs.

Length of presentation requested

Oral presentation: 17 min + 3 min questions

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Nuclear physics - experimental

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