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β decay of N=Z isotopes ^{96}Cd, ^{98}In and ^{100}Sn[1]

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The β-decay properties of the N=Z isotopes ^{96}Cd, ^{98}In and ^{100}Sn have been studied. The isotopes were produced at the National Superconducting Cyclotron Laboratory (NSCL) by fragmenting a 120 MeV/u ^{112}Sn primary beam in a Be target. The resulting radioactive beam was filtered in the A1900 and the newly commissioned Radio Frequency Fragment Separator to achieve a purity level suitable for decay studies. The observed production cross sections of these isotopes are lower than expected by factors of 10 to 30. The ^{100}Sn cross section is 0.25(15) pb, in sharp contrast with the 120 pb lower limit established at 63 MeV/u incident energy of the same primary beam. The half-life of ^{96}Cd, which was the last experimentally unknown waiting point half-life of the astrophysical rp-process, is $1.03^{+0.24}_{-0.21}$ s. The implications of the experimental $T_{1/2}$ value of ^{96}Cd on the abundances predicted by the rp-process and the origin of A=96 isotopes such as ^{96}Ru are explored. The measured half-lives of ^{98}In are 47(13) ms and 0.66(40) s, and $0.55^{+0.70}_{-0.31}$ s for ^{100}Sn. They are in agreement with previous determinations and lead to an improved precision.

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