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Spectroscopy of state-selected 94Ag isotopes

The isotope 94Ag has three long-lived states [1,2,3,4]: the ground state (T1/2 = 26 ms), a first long-lived (7+) isomer (T1/2 = 550 ms, E= *1350(400) keV), and second long-lived (21+) isomer (T1/2 = 400 ms, E* = 7-8 MeV). The (21+) isomer is of particular interest, because it is said to decay by (i) beta-decay and a long gamma-ray cascade [1], (ii) beta-p decay (BR ≈ 20%) [2], (iii) direct one-proton emission (BR ≈ 2-4 %) [3], and (iv) direct two-proton emission (BR = 0.5(3)%) [4]. However, one of the two direct one-proton decay channels could not been observed in a subsequent experiment [5]. In addition and more important, the 2p decay channel was not observed at all in this second experiment [5]. Mass measurements also pointed to inconsistencies in the proposed decay scheme [6,7].

The aim of the present Letter of intent is to produce 94Ag by a fusion-evaporation reaction (40Ca (4.8 MeV/u) on a 58Ni target) and select the 21+ isomeric state with PIPERADE. The isomerically pure 94Ag(m) will be implanted in the catcher foil of the Silicon cube detector, where the decay protons will be detected with 6 DSSSDs and the gamma rays with four high-efficiency germanium detectors. The experiment will allow the first time to perform decay spectroscopy with ultra clean samples, unlike previous spectroscopy experiments, and clarify the existence or not of the above mentioned decay channel.

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