DECAY SPECTROSCOPY

OF VERY NEUTRON-DEFICIENT LEAD ISOTOPES

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The very neutron deficient lead isotopes $^{179,\,178}$Pb have been observed using the fusion evaporation reaction ^{104}Pd (^{78}Kr, xn) $^{179,\,178}$Pb at the Accelerator Laboratory of University of Jyväskylä (JYFL), Finland. The production cross section of ^{179}Pb and ^{178}Pb are estimated to be around 200pb and 5pb, respectively.

The gas-filled separator RITU [1] was employed to transport and separate the recoiling nuclei of interest from the scattered beam and unwanted products. The GREAT [2] spectrometer was used to study decay of ^{178}Pb and its α-decay chain through α-α correlations. The α-decay energy, half-life, mass excess and the Q-value of ^{178}Pb were measured and compared with theoretical-model values. In addition the α-decay reduced width and hindrance factor for ^{178}Pb were deduced and compared in a systematical manner with other even lead isotopes.

On the other hand, the decay spectroscopy study of ^{179}Pb has been achieved through alpha-alpha and alpha-gamma correlations, which have allowed the ground-state configuration of ^{179}Pb to be assigned as $I^{\pi} = 9/2^{-}$. The decay of ^{179}Pb was measured to have an energy and half-life of $E_{\alpha} = 7356(5)$ keV and $t_{1\backslash2} = 2.7(2)$ ms, respectively. Mother (^{179}Pb) - daughter (^{175}Hg) correlated alpha-particle energy pairs and 80-keV gamma-rays in coincidence with the 7356(5)-keV alpha decay of ^{179}Pb were observed. The result will be discussed within the systematic frame work of the lead isotopes and also α-decay chains between Z=82 and N=82.

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