

First spectroscopic study of ^{51}Ar by the (p,2p) reaction

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The nuclear structure of ^{51}Ar , an uncharted territory so far, was studied by the (p,2p) reaction using γ -ray spectroscopy for the bound states and the invariant mass method for the unbound states. Two peaks were detected in the γ -ray spectrum and six peaks were observed in the $^{50}\text{Ar} + n$ relative energy spectrum. Comparing the results to our shell-model calculations, two bound and six unbound states were established. Three of the unbound states could only be placed tentatively due to the low number of counts in the relative energy spectrum of events associated with the decay through the first excited state of ^{50}Ar . The low cross sections populating the two bound states of ^{51}Ar could be interpreted as a clear signature for the presence of significant subshell closures at neutron numbers 32 and 34 in argon isotopes. It was also revealed that due to the two valence holes, unbound collective states coexist with individual-particle states in ^{51}Ar .

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