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Changes in charge radius of the high-spin isomers of the proton-hole states of indium

One of the most basic properties of nuclear states are their size. Yet, a microscopic understanding of the size behaviour of these nuclear isomers has proved challenging as it depends strongly on the region of the nuclear chart and type of nuclear isomer.

How the change in size (quantified by their change in charge radius) of nuclear isomers varies from their ground states gives important insight into the details of the nuclear forces which enhance their stability, which becomes especially relevant at the limits of stability.

Here we present laser spectroscopy measurements, performed at CERN-ISOLDE, of the changes in size of high-spin isomers of the proton-hole isotopes of indium, around the neutron-rich shell closure of $N = 82$, through their isomer shifts. The results present a particularly clean study of the effect of high-spin isomerism on nuclear size and the challenges to state-of-the-art nuclear theory in describing such systems compared to their ground states.

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