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Probing the neutron skin variations in isotope pairs by hyperon-antihyperon production in antiproton–nucleus interactions [Remote talk]

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We propose a new method to measure the evolution of the neutron skin thickness between different isotopes. We consider antiproton–nucleus interactions close to the production threshold of $\Lambda\bar{\Lambda}$ and $\Sigma^-\bar{\Lambda}$ pairs. At low energies, $\Lambda\bar{\Lambda}$ pairs are produced in $\bar{p} + p$ collisions, while $\Sigma^-\bar{\Lambda}$ pairs can only be produced in $\bar{p} + n$ interactions.

Within a simple geometrical picture we show that the production ratios for $\Sigma^-\bar{\Lambda}$ and $\Lambda\bar{\Lambda}$ pairs for two different isotopes are directly related to the variation of the neutron skin thickness for the two nuclei. Performing high statistics calculations with the Gie\ss en Boltzmann–Uehling–Uhlenbeck (GiBUU) transport model for several isotope pairs we verify a strong connection between double ratio of the $\Lambda\bar{\Lambda}$ and $\Sigma^-\bar{\Lambda}$ production probabilities and the difference of the neutron skin.

Primary author: POCHODZALLA, Josef (Johannes Gutenberg Universitaet Mainz (DE))

Presenter: POCHODZALLA, Josef (Johannes Gutenberg Universitaet Mainz (DE))

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