

# Measurement of $\Lambda$ -binding energies of light hypernuclei in Au+Au collisions at $\sqrt{s_{NN}} = 3$ GeV at RHIC

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Hypernuclei, which are special nuclei formed by nucleon cores and hyperons, are ideal platforms to study the hyperon-nucleon interactions. The  $\Lambda$ -binding energies ( $B_\Lambda$ ) of hypernuclei are direct observables encoding the  $\Lambda N$  and  $\Lambda NN$  interactions, which are relevant to understanding the “hyperon puzzle” in neutron stars. However, the measurements on the  $B_\Lambda$  of light hypernuclei are still controversial. A recent measurement by the A1 Collaboration reported  $B_\Lambda(^3_\Lambda\text{H}) = 523 \pm 13$  (stat.)  $\pm 75$  (syst.) keV, substantially larger than the historical world-average value of approximately 120 keV. For the mirror hypernuclei pair  $^4_\Lambda\text{H}$  and  $^4_\Lambda\text{He}$ , the charge-symmetry breaking (CSB) manifests itself as a difference in their  $B_\Lambda$ . The CSB in the ground state and the excited state reveal the difference between the  $\Lambda$ -p and  $\Lambda$ -n interactions. Together, these considerations motivate independent high-precision measurements.

As part of the STAR fixed target program, the STAR detector collected data in Au+Au collisions at  $\sqrt{s_{NN}} = 3$  GeV. The high production yield of light hypernuclei provides an opportunity to measure their  $B_\Lambda$  precisely. In this talk, we will present the measurement of the  $B_\Lambda$  of  $^3_\Lambda\text{H}$ ,  $^4_\Lambda\text{H}$ , and  $^4_\Lambda\text{He}$  with about 2 billion Au+Au collision events at  $\sqrt{s_{NN}} = 3$  GeV collected in 2021. The results will be presented together with the methods, calibrations, and systematic uncertainties of the measurements.

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