(Anti-)Proton and Light Nuclei Production in 3 GeV Au+Au Collisions from RHIC-STAR

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Light nuclei are loosely bound objects, with binding energies of only a few MeV. The systematic measurement of light nuclei production in heavy-ion collisions across a wide energy range provides a valuable probe of the QCD phase structure and helps us better understand the underlying production mechanism. In 2018, RHIC started the second phase of the beam energy scan program (BES-II). The STAR Fixed Target (FXT) program was designed to explore lower center-of-mass energies and higher baryon density regions. The STAR experiment has collected high-statistics data from Au+Au collisions at $\sqrt{s_{\rm NN}} = 3$ to 13.7 GeV under the FXT configuration.

In this poster, we will present measurements of the production of (anti-)proton and light nuclei in Au+Au collisions at $\sqrt{s_{\rm NN}} = 3$ GeV, utilizing 2 billion recorded events by the STAR experiment. In particular, we will report the measurements of anti-proton, ^{6}He, and ^{6}Li production, which are measured at this energy for the first time. The analysis covers central to peripheral collisions, spanning mid-rapidity to target rapidity. The transverse momentum (p_T) spectra, coalescence parameters (B_A), particle ratios, and compound yield ratios will be presented and compared with results at different collision energies.