

1 Flow Measurements of Light Nuclei Over a Large Rapidity in  
2 Heavy Ion Collisions at Relativistic Heavy Ion Collider

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6 Investigating the production of light nuclei through various observables  
7 is important in understanding the evolution of nuclear matter under extreme  
8 conditions. Flow observables provide valuable insights into the early  
9 stages of heavy-ion collisions. In this talk, we will present flow measurements  
10 of light nuclei (protons, deuterons, tritons, helium-3, and helium-  
11 4) in Au+Au collisions at various collision energies between  $\sqrt{s_{NN}} = 3.2$   
12 and 7.7 GeV. These measurements, facilitated by the fixed-target program  
13 (FXT) and the second phase of the Beam Energy Scan program (BES-II)  
14 of STAR at RHIC, cover a broad range of rapidity including the target  
15 rapidity, aiming to understand the behavior of light nuclei in this region.  
16 At  $\sqrt{s_{NN}} = 3$  GeV, a breaking of nucleon number (A) scaling is observed  
17 around  $y \approx 0.5$  for directed flow measurements, which may indicate the  
18 different production mechanisms of light nuclei across near-mid rapidity to  
19 target rapidities. In this presentation, we systematically study light nuclei  
20 flows ( $v_1$  and  $v_3$  relative to the first-order event plane) and A scaling  
21 across rapidities in higher collision energies from BES-II. These studies aid  
22 in exploring the equation of state at high baryon density.