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STAR Fixed Target Results

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The RHIC Beam Energy Scan (BES-I) program, which covers center-of-mass energies 7.7 GeV – 62.4 GeV, was proposed to look for the turn-off of signatures of the quark gluon plasma (QGP), search for a possible QCD critical point, and study the nature of the phase transition between hadronic and partonic matter. RHIC BES-I has shown that the partonic interactions are dominant at center-of-mass energies above 20 GeV. Several interesting observables, including v_1 of protons and Lambdas, v_2 of all identified hadrons, and net-proton higher moments, show interesting behavior below 20 GeV and could suggest a transition to a hadron dominated regime. Data from energies lower than 7 GeV could help determine whether these behaviors are indicative of phase transitions or criticality. The goal of the STAR Fixed-Target Program is to extend the collision energy range in BES II with the same detector to lower energies than is feasible at RHIC with colliding beams. In 2014 STAR inserted a gold target into the beam pipe and conducted a Au + Au test run at center-of-mass energy 3.9 GeV. In 2015 an additional Au + Au test run at center-of-mass energy 4.5 GeV, as well as an Al + Au test run at a center-of-mass energy of 4.9 GeV, were conducted. First physics results from Au + Au and Al + Au fixed-target collisions will be presented; these results include inclusive spectra, azimuthal anisotropies, and Bose-Einstein correlations. These results demonstrate that STAR has good particle identification capabilities for this fixed target configuration and can efficiently reconstruct fixed target events. The results will be compared with published results from the AGS. The implications for the fixed target program after the completion of the inner TPC (iTPC) and endcap time-of-flight (eTOF) detector upgrades will also be discussed.

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