

1 **Measurements of Proton Higher Order Cumulants in $\sqrt{s_{NN}} = 3\text{GeV}$ Au+Au Collisions**
2 **and Implication of the QCD Critical Point**

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6 The first RHIC Beam Energy Scan (BES I) was run from 2010-2014 to search for the turn-
7 off signatures of the quark-gluon plasma (QGP), evidence of the first order phase transition, and
8 the possible QCD critical point. In BES I, the higher moment signals, namely $\kappa\sigma^2$, show a non-
9 monotonic energy dependence in the energy range $\sqrt{s_{NN}} = 7.7$ to 62.4 GeV with a significance of
10 3.1σ . Motivated by the findings of BES I, the STAR Fixed-Target program extends the energy range
11 to $\sqrt{s_{NN}} = 3.0$ GeV. In this talk, we will discuss a systematic study of cumulants of event-by-event
12 proton multiplicities for the first dedicated fixed-target physics run in $\sqrt{s_{NN}} = 3.0$ GeV Au+Au
13 collisions. The data, 140 million minimum bias events, were recorded with the STAR detector at
14 the Relativistic Heavy Ion Collider facility with a $250\mu\text{m}$ target (1% interaction probability). The
15 measurements will be compared to results from the BES I program and the HADES experiment
16 and simulations from the Ultra Relativistic Quantum Molecular Dynamics (UrQMD) model.
