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Correlations and fluctuations measured by STAR experiment

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The STAR (Solenoidal Tracker at RHIC) experiment is conducted at the
Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory.
Originally designed to study the properties of the Quark-Gluon Plasma (QGP) and the nature of strongly interacting matter under extreme conditions similar to those in the early Universe, STAR's scope expanded with the initiation of the Beam Energy Scan program. This program broadened the investigation to include the region of high baryonic densities, making STAR an excellent tool for studying the phase diagram of strongly interacting matter.
This talk report focuses on measurements of correlations and fluctuations performed by STAR. The current results of measurements of the fluctuations in net-proton number (including higher-order cumulants), which are crucial for understanding the thermodynamic properties of QGP phase transitions, including the search for the Critical Point, will be presented. Femtoscopic measurements, which utilize correlations between pairs of particles, enable the exploration of collision dynamics and the examination of particle interaction properties. Recent femtoscopic measurements involving kaons, p – Λ, and d – Λ pairs will be discussed.

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