

Overview of the star hot QCD results

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In 2026, the STAR experiment at the Relativistic Heavy Ion Collider completed its final data-taking period. Over its years of operation, STAR collected a comprehensive data set for studying strongly interacting matter under extreme conditions. A large amount of these data remains under analysis, so the STAR physics program will continue to provide important results in the coming years.

A central part of the STAR hot QCD program is the second phase of the Beam Energy Scan, BES-II, which explores the QCD phase diagram in the region of high baryon density using Au+Au collisions at center-of-mass energies of $\sqrt{s_{NN}} = 3\text{--}27$ GeV in collider and fixed-target modes. With major detector upgrades that significantly improved STAR's tracking and particle identification capabilities, together with high-statistics data samples, BES-II enables more precise studies of the transition between hadronic matter and the quark-gluon plasma, as well as the search for possible signatures of the QCD critical point.

In this talk, recent STAR results from the hot QCD program will be reviewed. The discussion will include selected BES-II measurements related to particle production, collective phenomena, anisotropic flow, correlations, hypernuclei, global polarization, spin alignment, and net-proton higher-order moments. The overview will also include recent results from O+O and Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV, including measurements of jet quenching and dilepton production. Together, these measurements provide constraints on the properties of hot and dense QCD matter over a broad range of collision energies, baryon chemical potentials, and collision systems, as well as on the structure of the QCD phase diagram.