

A Compact TPC for the sPHENIX Experiment

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The sPHENIX detector at RHIC is being designed to precisely measure jets, jet correlations, and dilepton pairs with the goal of learning about the energy-dense quark-gluon plasma. With these measurements in mind, sPHENIX will employ a compact TPC covering $20\text{cm} < r < 78\text{ cm}$ and $|\eta| < 1.1$ as the central tracker.

Utilizing an optimized Ne-CF₄ gas mixture, zigzag readout pads, a 1.4T solenoid, and a modified SAMPA chip for streaming readout, the TPC will provide a satisfactory position resolution for measuring target observables in a high event rate environment.

Quad-GEMs will be used for gain and reduction of ion-backflow (IBF) below 1%. The study of a passive gating grid to further reduce IBF is currently underway. In addition, the design of a state-of-the-art laser system for calibration and monitoring of space charge distortions is being finalized. The design of the TPC, space charge elimination and compensation technologies, and test beam results will be presented.

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