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## Initial state and 3D-hydrodynamic studies of heavy ion collisions with the proposed sPHENIX forward detector.

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The hydrodynamic behavior of the strongly interacting Quark-Gluon Plasma (QGP) has mostly been studied at mid-rapidity and important additional constraints on the longitudinal expansion of the medium are needed, in particular to help in constraining the initial state. The forward rapidity bulk medium initial state is also sensitive to low- $x$  partons in one nucleus and high- $x$  partons in the other. Local thermalization implies that different rapidity slices have different thermodynamic properties, including significantly higher baryon chemical potential.

The PHENIX experiment is proposing a major suite of upgrades called sPHENIX that includes a new forward rapidity spectrometer with high precision tracking, particle identification, and calorimetry.

The new detector is aiming to cover down to very forward angles and study hard probes such as heavy flavor, jets, photons and high  $p_T$  hadrons. This poster will detail the layout of this new forward spectrometer and discuss how we will pin down the 3-dimensional hydrodynamic properties of the QGP.

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