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Models of the 3-D Initial Hydro State: The "Club Sandwich" Picture

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The large majority of observations made of high-energy heavy-ion collisions at RHIC and LHC have been within a narrow range at mid-rapidity. These have been greatly informative, of course; but they've provided a window only onto a central "slice" of the created medium, leaving the full 3-D picture of the collision as a relatively unexplored frontier. How the initially locally thermalized hydro state comes into being across three dimensions involves fundamentally new QCD physics, which we can hope to diagnose via measurements spanning wide ranges of rapidity and correlations across them.

Here we present and discuss the so-called "Club Sandwich picture", an inclusive framework for describing and parameterizing 3-D initial energy density profiles, not based on any particular stopping mechanism but only on the general considerations of energy and momentum conservation and causality. It is proposed, that frameworks of this type can serve as a useful bridge between final-state observations of energy/momentum flow and new physics models for the initial medium creation mechanisms.

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