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Reducing uncertainty in relativistic heavy ion collision centrality[1]

LANNY RAY, MICHAEL DAUGHERITY, University of Texas at Austin — Uncertainties in heavy ion collision centrality measures relevant to the Relativistic Heavy Ion Collider (RHIC) program are estimated using a Monte Carlo Glauber collision model where particle production is generated via "soft + hard" two-component phenomenology [1]. Collision centrality is characterized by the measured multiplicity frequency distribution and in the model by the overlap geometry of two colliding nuclei. The principle sources of uncertainty include those associated with the input parameters to the Monte Carlo model and errors in the experimental minimum-bias multiplicity distributions. The latter include backgrounds plus uncertainties in the trigger and collision vertex finding efficiencies. It is shown that simultaneous analysis of the minimum-bias multiplicity frequency distributions and trigger detector output for both heavy ion and proton-proton collisions using a power-law representation of the data enables the systematic errors in centrality measures to be reduced compared to previous published analyses, thus permitting access to peripheral collision data from RHIC. Simulation results are presented for minimum-bias Au-Au collisions at 200 GeV. [1] R. L. Ray and M. Daugherity, nucl-ex/0702039.

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