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Importance of correlations and fluctuations on the initial eccentricity

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One of the early, important discoveries at RHIC was that the magnitude of the elliptic flow component, v_2, was not only large, but also for the first time reached the limit predicted by hydrodynamical calculations. In a hydrodynamics picture, elliptic flow is understood to be a consequence of the spatial anisotropy of the initial matter distribution. This anisotropy is usually characterized by the eccentricity of the overlap region of the colliding nuclei. Thus, the interpretation of the anisotropic flow data requires a detailed understanding of the effective initial source eccentricity. In this talk, various ways of defining this effective eccentricity will be addressed. In particular, the focus will be on the participant eccentricity, which defines the initial-state asymmetry wrt the major axes of the overlap ellipse formed by the participants. Reasonable variation of the density parameters in the Glauber simulation, as well as variations in how matter production is modeled, do only moderately affect the eccentricity. However, as will be outlined, participant spatial correlations in the interaction of two nuclei do play an essential role, in particular for the Cu+Cu system. Including these correlations in the calculation of the participant eccentricity results in larger values for the eccentricity. One particularly important consequence is that the fourth order participant eccentricity cumulant does not approach the spatial anisotropy obtained assuming a smooth nuclear matter distribution.