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Abstract for an Invited Paper
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Ginzburg criterion for the glass transition

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I will discuss the onset of slow relaxation in glassy systems by constructing a static replica field theory approach to the problem. At the mean field level, criticality in the four point correlation functions arises because of the presence of soft modes and I will present an effective replica field theory for these critical fluctuations. At the Gaussian level many physical quantities are obtained: the correlation length, the exponent parameter that controls the Mode-Coupling dynamical exponents for the two-point correlation functions, and the prefactor of the critical part of the four point correlation functions. A one-loop computation allows to identify the region in which the mean field Gaussian approximation is valid. The result is a Ginzburg criterion for the glass transition, which confirms that the upper critical dimension for the glass transition is d=8. Finally, I will present numerical results for hard spheres in dimension d ranging from 3 to 9 that support the analytical results.