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Signatures of an Inhomogeneous Regime FABIAN RENNECKE, ROBERT D. PISARSKI, Brookhaven National Laboratory — Heavy-ion collisions at small beam energies have the potential to reveal the rich phase structure of QCD at large densities. Among the possible phases of dense QCD matter are inhomogeneous regimes, which feature periodic modulations of the spatial structure. We argue that if the matter created in heavy-ion collisions traverses such a regime, it can leave imprints in the correlations of particles. Spatial inhomogeneities result in a characteristic momentum dependence of particle number correlations, which therefore is an experimentally accessible signature of an inhomogeneous regime. As an explicit example, we consider an inhomogeneous pion quantum spin liquid phase which can occur at large density. In this phase we compute net-proton number fluctuations in a large-N limit, as well as momentum-dependent particle number correlations on the freeze-out surface. These results can serve as a first guideline for a systematic search for inhomogeneous phases with heavy-ion collisions.

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