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Quenched disorder and vestigial nematicity in the pseudo-gap regime of the cuprates LAIMEI NIE, Stanford University, GILLES TARJUS, LPTMC, Universite Pierre et Marie Curie, STEVEN KIVELSON, Stanford University — We carry out a theoretical analysis of the Landau-Ginzburg-Wilson effective field theory of a classical incommensurate charge-density-wave (CDW) in the presence of weak quenched disorder. While the possibility a sharp phase transition and long-range CDW order are precluded in such systems, we show that any discrete symmetry breaking aspect of the charge order (nematicity in the case of the unidirectional (stripe) CDW we consider explicitly) generically survives up to a non-zero critical disorder strength. Such “vestigial order,” which is subject to unambiguous macroscopic detection, can serve as an avatar of what would be CDW order in the zero disorder limit. Various recent experiments in the pseudo-gap regime of the hole-doped cuprate high-temperature superconductors are interpreted in light of these results.

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