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Signatures of Quasiparticle Interference from Random Disorder in High-Temperature Superconductors[1] MIGUEL SULANGI, JAN ZAANEN, Univ of Leiden — We obtain real-space and Fourier-transformed maps of the local density of states of the cuprates for various kinds of disorder. We consider point-like impurities; smooth, "Coulombic" disorder; and disorder arising from random hoppings, on-site energies, and superconducting gaps. For the case of multiple point-like impurities it is found that its Fourier-transformed LDOS resembles that of a single point-like scatterer, but with additional noise. Disorder from a large number of randomly placed smooth potential scatterers gives rise to stripe-like patterns in the real-space LDOS, while its Fourier-transformed map reveals that small momenta in the nodal directions dominate scattering processes at low energies. The cases of disorder from random hoppings, on-site potentials, and gaps are studied, and it is shown that their Fourier-transformed maps are qualitatively different. We explore the possibility that smooth-potential and random disorder might explain the stripe-like patterns seen in STM studies. We also apply this analysis to a variety of proposed ground states of the cuprates with coexisting order.

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