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Fluctuation Maps of Competing Order in Cuprates[1] PETER MISTARK, ROBERT MARKIEWICZ, IOANA BUDA, CHRISTOPHER LANE, ARUN BANSIL, Northeastern University — We demonstrate how the density-functional-based Lindhard susceptibility can be used to probe the origin of the cuprate pseudogap. To start we create maps, in doping vs temperature space, of a class of momentum vectors at which the susceptibility is maximum, called fluctuation maps. These maps clearly show how closely related different materials are and allow us to sort materials into equivalence classes with topologically equivalent fluctuation maps. From these classes, we can chose reference families, which depend on a minimal number of hopping parameters. This allows us to tune between different cuprates by varying just a single parameter. Using these concepts, we show how the pseudogap is controlled by bosonic entropy, and how this is encoded in the susceptibility. Our analysis reveals one last surprise: the VHS plays an important role in entropic effects, and in turn the physics of the VHS is strongly entwined in pseudogap physics.
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