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Towards the Standard Model for Fermi Arcs from a Wilsonian Reduction of the Hubbard Model SEUNGMIN HONG, PHILIP PHILLIPS, University of Illinois, Urbana-Champaign, UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN TEAM — Two remarkable features emerge from the exact Wilsonian procedure for integrating out the high-energy scale in the Hubbard model. At low energies, the number of excitations that couple minimally to the electromagnetic gauge is less than the conserved charge, thereby implying a breakdown of Fermi liquid theory. In addition, two charge e excitations emerge in the lower band, the standard projected electron and a composite entity (comprised of a hole and a charge $2e$ bosonic field) which give rise to poles and zeros of the single-particle Green function, respectively. The poles generate spectral weight along an arc centered at $(\pi/2, \pi/2)$ while the zeros kill the spectral intensity on the back-side of the arc. The result is the Fermi arc structure intrinsic to cuprate phenomenology. The presence of composite excitations also produces a broad incoherent pseudogap feature at the $(\pi, 0)$ region of the Brillouin zone, thereby providing a mechanism for the nodal/anti-nodal dichotomy seen in the cuprates.

Seungmin Hong
University of Illinois, Urbana-Champaign

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