Abstract Submitted
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Effects of disordered Ru substitution in $BaFe_2As_2$: possible superdiffusion mechanism in real materials[1] LIMIN WANG, TOM BERLIJN, Brookhaven National Lab, YAN WANG, University of Florida, CHIA-HUI LIN, Brookhaven National Lab, State university of New York, Stony Brook, PETER HIRSCHFELD, University of Florida, WEI KU, Brookhaven National Lab, State university of New York, Stony Brook — An unexpected insensitivity of the Fermi surface to impurity scattering is found in Ru substituted $BaFe_2As_2$ from first-principles theory, offering a natural explanation of the unusual resilience of transport and superconductivity to a high level of disordered substitution in this material. This robustness is shown to originate from a coherent interference of correlated on-site and inter-site impurity scattering, similar in spirit to the microscopic mechanism of superdiffusion in one dimension. Our result also demonstrates a strong substitution dependence of the Fermi surface and carrier concentration, and provides a natural resolution to current discrepancies in recent photoelectron spectroscopy. These effects offer a natural explanation of the diminishing long-range magnetic, orbital and superconducting order with high substitution.

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Limin Wang
Brookhaven National Lab

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