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Nature of the Cuprate Pseudogap State in the Presence of High Magnetic Fields PETER SCHERPELZ, DAN WULIN, KATHRYN LEVIN, James Franck Institute and Department of Physics, University of Chicago, ATTIPAT RAJAGOPAL, Inspire Institute and Harish-Chandra Research Institute — We address the important question of how to characterize the pseudogap state of superconductors under the influence of magnetic fields strong enough to lead to vortex lattices in the condensate. Here we adopt a preformed pair interpretation of the pseudogap in which non-condensed pairs (arising from a stronger-than-BCS attraction) are present above and below T_c . We use a simple extension of Gor'kov theory to arrive at a formalism for treating BCS-to-BEC crossover physics. We thereby demonstrate how these pairs organize above the transition T_c into precursors of a vortex configuration via small distortions of the superconducting vortex state. We believe this provides a possible scenario for a normal state “pseudo”-vortex state which has been the object of discussion in the literature. Because their dispersion is no longer effectively one-dimensional, this precursor vortex configuration appears to enable otherwise problematic “Bose condensation” in a field.

Peter Scherpelz
James Franck Institute and Department of Physics, University of Chicago

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