Abstract Submitted
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Weak phase stiffness and nature of the quantum critical point in underdoped cuprates[1] WEI KU, YUCEL YILDIRIM, Brookhaven National Laboratory — We demonstrate that the zero-temperature superconducting phase diagram of underdoped cuprates can be quantitatively understood in the strong binding limit, using only the experimental spectral function of the "normal" pseudo-gap phase without any free parameter. In the prototypical $(La_{1-x}Sr_x)_2CuO_4$, a kinetics-driven d-wave superconductivity is obtained above the critical doping $\delta_c \sim 5.2\%$, below which complete loss of superfluidity results from local quantum fluctuation involving local p-wave pairs. Near the critical doping, a enormous mass enhancement of the local pairs is found responsible for the observed rapid decrease of phase stiffness. Finally, a striking mass divergence is predicted at δ_c that dictates the occurrence of the observed quantum critical point and the abrupt suppression of the Nernst effects in the nearby region. * Phys. Rev. B 92, 180501(R) (2015); Phys. Rev. X 1, 011011 (2011).

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