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Quantum-critical point of charge-density-wave order under superconducting dome in hole-doped cuprates YUXUAN WANG, ANDREY CHUBUKOV, University of Wisconsin-Madison — We analyze, within the spin-fermion model, a charge-density-wave (CDW) order in hole-doped cuprates with incommensurate momenta $(\pm Q, 0)$ and $(0, \pm Q)$. We show that spin fluctuations mediate attractive interaction in the CDW channel at these momenta. Moreover, the enhancement of the CDW vertex is logarithmical. We solve for the onset of CDW order at the magnetic critical point (when fermionic self-energy cannot be neglected) and show that the corresponding critical temperature T_{CDW} may in fact be larger than superconducting T_c. We further consider CDW instability at a finite magnetic correlation length ξ and show that the logarithm is cut off by ξ_{cr}. As a result, T_{CDW} monotonically decreases with decreasing ξ and vanishes at some finite ξ. This gives rise to a quantum-critical point under the SC dome. As a consequence, the SC dome is divided into two regions, one in which only superconductivity is present, and the other in which CDW and superconducting orders co-exist. We show that a number of observed features of underdoped cuprates, including a non-monotonic dependence of T_c on doping, can be explained by a competition between the two orders. We compute the fermionic spectral function and compare with recent ARPES results.

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