

Abstract Submitted
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Real-Space Holon Pairing in Underdoped Cuprates¹ TIMOTHY LOVORN, SANJOY SARKER, University of Alabama — We examine the behavior of a recently developed model for underdoped cuprates [1] in the fluctuation regime above T_c . It is characterized by a spin gap and describes sublattice preserving hopping by holons and holon pairs, accompanied by a backflow of spin singlets. The singlets form a short-range valence-bond state which is continuously connected to the correct spin state at half filling. The theory, thus constrained, leads to the correct phase diagram and also explains the two-dimensionality of the metallic states. Superconductivity is due to pair hopping, as holons form real-space pairs at low densities and undergo a Bose-Einstein condensation below T_c . The pairs exist up to a temperature $T_p > T_c$, which is consistent with the observed Nernst effect and diamagnetism above T_c . The pair spectrum is calculated by identifying poles of the pair Green's function. Here we show that the specific heat of this system is in qualitative agreement with recent measurements [2].

[1] S. K. Sarker and T. Lovorn, Phys. Rev. B **82**, 014504 (2010); *ibid* **85**, 144502 (2012)

[2] H.-H. Wen *et al.*, Phys. Rev. Lett. **103**, 067002 (2009)

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