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Two-component electron fluid and pseudogap asymmetry in underdoped high-T_c cuprate superconductors JAMES STOREY, Victoria University of Wellington, New Zealand, JEFFERY TALLON, Industrial Research Ltd., New Zealand, GRANT WILLIAMS, Victoria University of Wellington, New Zealand — Evidence from NMR of a two-component spin system in the cuprate high-T_c superconductors is shown to be paralleled by similar evidence from the total electronic entropy so that a two-component quasiparticle fluid is implicated. We propose that this two-component behavior arises from reconstruction of the energy-momentum dispersion into two branches in the pseudogap regime. If correct then it follows that single-component electronic behavior will be recovered when the pseudogap closes in the overdoped regime. We illustrate this by calculating the spin susceptibility using the resonating valence bond spin liquid model developed by Yang, Rice and Zhang, finding excellent agreement with the NMR results. In addition, we find that the particle-hole asymmetric pseudogap of this model accounts for both the large thermoelectric power, and the downturn in resistivity observed in underdoped cuprates.

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