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The underdoped cuprates as fractionalized Fermi liquids EUN GOOK MOON, SUBIR SACHDEV, Harvard University — We model the underdoped cuprates using fermions moving in a background with local antiferromagnetic order. The antiferromagnetic order fluctuates in orientation, but not in magnitude, so that there is no long-range antiferromagnetism, but a 'topological' order survives. The normal state is described as a fractionalized Fermi liquid (FL*), with electron-like quasiparticles coupled to the fractionalized excitations of the fluctuating antiferromagnet. The FL* and its mother state, algebraic charge liquid, reveal interesting features in the underdoped cuprates such as shift of the Fermi pocket center from the magnetic Brillouin zone boundary . Also, with transition to superconductivity, the normal states can explain puzzling experiment data such as a nodal-anti-nodal 'dichotomy' identifying characteristics of the two gaps. Implication of our model and extensions are discussed.

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