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Fermi surface pockets in Na_xCoO_2 for $x = 0.71$ and 0.84: Localization effects and emergence of a quantum spin-liquid ground state LUIS BALICAS, YOUNJUNG JO, National High Magnetic Field Lab, Florida State University, Tallahassee, FL 32310, FANGCHENG CHOU, Center for Condensed Matter Sciences, National Taiwan University, Taipei 10617, Taiwan, PATRICK LEE, Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachussetts 02139 — Here we report the observation of Fermi surface (FS) pockets via the Shubnikov de Haas effect in Na_xCoO_2 for $x = 0.71$ and 0.84, respectively. Our observations indicate that the FS of each compound can intersect their corresponding Brillouin zones, as defined by the previously reported superlattice structures, leading to small reconstructed FS pockets, only if a precise number of holes per unit cell is *localized*. For $0.71 \leq x < 0.75$ the coexistence of itinerant carriers and localized $S = 1/2$ spins on a paramagnetic triangular lattice leads, at low temperatures, to the observation of non Fermi-liquid behavior in the electrical transport and heat capacity properties. Namely, an anomalous exponent in the temperature dependence of the resistivity and a logarithmic divergence of the heat capacity divided by temperature as the temperature is lowered. These observations suggest the possibility of a unique quantum spin-liquid ground state resulting from the interplay between itinerant carriers and fluctuating $S = 1/2$ spins on a frustrated lattice.

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