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Spin rotational symmetry breaking by orbital current patterns in two-leg Cu-O Hubbard ladders[1] PIOTR CHUDZINSKI, DPMC-MaNEP, University of Geneva, MARC GABAY, LPS, Universite Paris-Sud 11, Orsay, THIERRY GIAMARCHI, DPMC-MaNEP, University of Geneva — In the weak-coupling limit, we study, as a function of doping, two-leg ladders with a unit cell containing both Cu and O atoms. For purely repulsive interactions, using bosonization and a novel RG scheme, we find that in a broad region of the phase diagram, the ground state consists of a pattern of orbital currents (OCP) defined on the top of an incommensurate density wave. The internal symmetry of the OCP is specific for the ladder structure, different than the ones suggested up to now for 2D cuprates. We focus on this OCP and look for measurable signals of its existence: we compute magnetic fields induced within the ladder and we check what kind of changes in the phase diagram one may expect due to SU(2) spin-rotational symmetry breaking. We also investigate a single impurity problem (incl. OCP): we discuss if Kondo physics is at play, and make qualitative predictions about the nature of impurity backscattering. This enables us to show the influence of SU(2) symmetry breaking on conductivity. We estimate the value of gap opened due to the OCP, give analytic expressions for correlation functions and discuss magnetic properties of a new phase.

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