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**Current Carrying Ground State in a Bi-layer Model** SYLVAIN CAPPONI, Laboratoire de Physique Théorique UMR 5152, Université Paul Sabatier,118 route de Narbonne, 31062 Toulouse, France, CONGJUN WU, Department of Physics, Stanford University, SHOU-CHENG ZHANG, Department of Physics, Stanford University — Strongly interacting systems have been conjectured to spontaneously develop current carrying ground states under certain conditions. We conclusively demonstrate the existence of a commensurate staggered interlayer current phase in a bi-layer model by using the recently discovered quantum Monte-Carlo algorithm without the sign problem. A pseudospin SU (2) algebra and the corresponding anisotropic spin-1 Heisenberg model are constructed to show the competition among the staggered interlayer current, rung singlet and charge density wave phases.

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