

Abstract Submitted  
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**Detection of entanglement by helical Luttinger liquids** KOJI SATO, Tohoku Univ, YAROSLAV TSERKOVNYAK, University of California, Los Angeles — A Cooper-pair or electron-hole splitter is a device capable of spatially separating entangled fermionic quasiparticles into mesoscopic solid-state systems such as quantum dots or quantum wires. We theoretically study such a splitter based on a pair of helical Luttinger liquids, which arise naturally at the edges of a quantum spin Hall insulator. Equipping each helical liquid with a beam splitter, current-current cross correlations can be used to construct a Bell inequality whose violation would indicate nonlocal orbital entanglement of the injected electrons and/or holes. Due to the Luttinger-liquid correlations, however, the entanglement is suppressed depending on ambient temperature and voltage bias.

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