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Synthetic helical liquid in a quantum wire MARIANA MALARD, Universidade de Brasília, GEORGE JAPARIDZE, Andronikashvili Institute of Physics and Ilia State University, HENRIK JOHANNESSON, University of Gothenburg — We show that the combination of a Dresselhaus interaction and a spatially periodic Rashba interaction leads to the formation of a helical liquid in a quantum wire when the electron-electron interaction is weakly screened. The effect is sustained by a helicity-dependent effective band gap which depends on the size of the Dresselhaus and Rashba spin-orbit couplings. We propose a design for a semiconductor device in which the helical liquid can be realized and probed experimentally.

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