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**Stability of the helical spin mode in RKKY systems with disorder** YOUNGHYUN KIM, University of California, Santa Barbara, MENG CHENG, BELA BAUER, ROMAN LUTCHYN, Microsoft Research Station Q — Motivated by the experimental proposals[1-4] trying to realize topological superconductivity and Majorana zero-energy modes in RKKY systems, we study magnetic properties of one-dimensional spin chains consisting of localized magnetic moments coupled by itinerant electrons via the Rudermann-Kittel-Kasuya-Yosida (RKKY)-type interaction. As a source of itinerant electrons, we consider one- and two-dimensional electron gas with spin-orbit coupling. We obtain the phase diagram of the system in the presence of Rashba spin-orbit coupling in a clean limit, and identify the stability regions for the helical spin mode. We then examine the stability of this mode using diagrammatic techniques and Monte Carlo in presence of disorder. [1] S. Nadj-Perge, I. K. Drozdov, B. A. Bernevig, and Ali Yazdani, Phys. Rev. B 88, 020407(R) (2013) [2] Jelena Klinovaja, Peter Stano, Ali Yazdani, and Daniel Loss, Phys. Rev. Lett. 111, 186805 (2013) [3] M. M. Vazifeh and M. Franz, Phys. Rev. Lett. 111, 206802 (2013) [4] Bernd Braunecker and Pascal Simon, Phys. Rev. Lett. 111, 147202 (2013)

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