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Helical Majorana fermions in d+id'-wave topological superconductivity of doped correlated quantum spin Hall insulators[1] CHUNG-HOU CHUNG, National Chiao-Tung University, Taiwan, SHIH-JYE SUN, National University of Kaohsiung, Taiwan, YUNG-YEH CHANG, National Chiao-Tung University, Taiwan, WEI-FENG TSAI, National Sun Yat-Sen University, Taiwan, FUCHUN ZHANG, Zejiang University, China — Large Hubbard U limit of the Kane-Mele model on a zigzag ribbon of honeycomb lattice near half-filling is studied via a renormalized mean-field theory. The ground state exhibits time-reversal symmetry (TRS) breaking $d_{x^2-y^2} + id_{xy}$-wave superconductivity. At large spin-orbit coupling, the Z_2 topological phase with non-trivial spin Chern number in the pure Kane-Mele model is persistent into the TRS broken state (called "spin-Chern phase"), and has two pairs of counter-propagating helical Majorana modes at the edges. As the spin-orbit coupling is reduced, the system undergoes a topological quantum phase transition from the spin-Chern to chiral superconducting states. Possible relevance of our results to adatom-doped graphene and irridate compounds is discussed.Ref.:Shih-Jye Sun, Chung-Hou Chung, Yung-Yeh Chang, Wei-Feng Tsai, and Fu-Chun Zhang, arXiv:1506.02584.

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