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The Andreev reflection in a superconductor-normal metal junction of a doped correlated quantum spin Hall insulator[1] YUNG-YEH CHANG, Department of Electrophysics, National Chiao-Tung University, HsinChu, Taiwan, 300, CHUNG-YU MOU, Department of Physics, National Tsing-Hua University, HsinChu, Taiwan 300, CHUNG-HOU CHUNG, Dept. of Electrophysics, Natl. Chiao-Tung Univ., HsinChu, Taiwan, 300 ; Physics Division, Natl. Center for Theoretical Sciences, HsinChu, Taiwan, 300 — Andreev conductance across a normal metal-superconductor (N-S) junction of doped correlated quantum spin Hall insulator on honeycomb lattice is theoretically studied via Blonder-Tinkham-Klapwijk (BTK) formalism. The normal side is modeled by the doped Kane-Mele (KM) model. The superconducting side is a doped correlated KM t-J model, which has been shown to feature d+id'-wave spin singlet pairing. With increasing intrinsic spin-orbit coupling, the doped KM t-J system undergoes a topological phase transition from the chiral d-wave superconductivity to the Z_2 spin-Chern superconducting phase with helical Majorana fermions at edges. We apply a local strain on the N-S interface to generate an effective Dirac-delta barrier and study the transport near the chiral-helical phase transition in the weak tunneling limit. We explore the Andreev conductance at the K and K Dirac points, respectively and find the distinctive behaviors across the transition. Relevance of our results for the adatom-doped graphene is discussed. Reference: S.J. Sun, C.H. Chung, Y.Y. Chang, W.F. Tsai, and F.C. Zhang, arxiv:1506.02584."

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