

Abstract Submitted  
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**Dephasing effect on backscattering of helical surface states in 3D topological insulators** HAIWEN LIU, Peking University, China, HUA JIANG, Soochow University, China, QING-FENG SUN, X.C. XIE, Peking University, China — We analyze the dephasing effect on the backscattering behavior of the helical surface states in 3D topological insulators. Considering the dilute non-magnetic impurities condition, we calculate the second-order scattering amplitude and the backscattering cross-section for both short-range and long-range scattering potentials. Our results indicate the combination effect of dephasing and scattering can cause backscattering in the helical SS, although one of them can not alone. In specific, the long-range Coulomb potential can cause extremely large backscattering when energy is close to the Dirac point. This large backscattering can lead to the anomalous “gap-like” features observed in recent experiments [*Nat.Phys.***7**, 840(2011)].

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