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**Realizing Majorana zero mode by Proximity Effect between Topological Insulator and d-wave Superconductor** ZIXIANG LI, CHEUNG CHAN, HONG YAO, Institute for Advanced Study, Tsinghua University, Beijing, 100084, China — We study the proximity effect between a topological insulator (TI) and a d-wave superconductor systematically. We find that because of the difference of lattice structures between the topological insulator and the d-wave superconductor, a finite s-wave component, coexisting with d-wave component, in superconducting pairing emerges in the surface states of topological insulators. Moreover, we show that disorder has significant effects on suppressing d-wave pairing and enhancing s-wave pairing in topological insulators. This result qualitatively explains the recent experimental work, which reports the nearly isotropic pairing gap on the TI's surface states induced by proximity with a d-wave superconductor [Nature Physics 9, 621-625 (2013)]. Finally, we consider the system of TI and d-wave superconductor in presence of vortices and find evidences of Majorana zero mode in the vortex core, which may be detectable in future experiments.

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