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**Persistence of Topological Order and Formation of Quantum Well States in Topological Insulators  $B_2(\text{Se},\text{Te})_3$  under Ambient Conditions<sup>1</sup>**

CHAOYU CHEN, XINGJIANG ZHOU<sup>2</sup>, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China — We report high resolution angle-resolved photoemission measurements on the surface state of the prototypical topological insulators,  $\text{Bi}_2\text{Se}_3$ ,  $\text{Bi}_2\text{Te}_3$  and  $\text{Bi}_2\text{Se}_{0.4}\text{Te}_{2.6}$ , upon exposing to ambient conditions. We find that the topological order persists even when the surface is exposed to air at room temperature. However, the surface state is strongly modified after such an exposure. Particularly, we have observed the formation of two-dimensional quantum well states near the surface of the topological insulators after the exposure which depends sensitively on the original composition,  $x$ , in  $\text{Bi}_2\text{Se}_{3-x}\text{Te}_x$ . These rich information are crucial in utilizing the surface state and in probing its physical properties under ambient conditions.

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