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**Electronic structure of the side surface of $Bi_2Se_3$**[1] CHANG-YOUN MOON, JINHEE HAN, HYUNGJUN LEE, HYOUNG JOON CHOI, Department of Physics and IPAP, Yonsei University, Korea — We investigate the electronic band structure of a side surface geometry, other than the conventional [111] surface, of the topological insulator $Bi_2Se_3$ using the first-principles pseudopotential calculations. As $Bi_2Se_3$ is known to be a strong topological insulator, it is expected that an arbitrary surface would have the topological surface state characterized by Dirac-cone-like band dispersion and spin-momentum coupling. Here we indeed obtain surface states with linear band dispersion around the Gamma point, but with a strong anisotropy with different group velocities along different k-directions. Low energy effective hamiltonian is proposed, and physical implications of the anisotropic Dirac fermions are also discussed.

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