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3D Topological Insulators in the Continuum with Nearly Flat Bands CONGJUN WU, YI LI, University of California, San Diego, XIANGFA ZHOU, University of Science and Technology of China — We propose a three-dimensional topological insulating state in the harmonic potential with a strong spin-orbit coupling breaking the inversion symmetry. The system gives rise to Landau-level like quantization with the full 3D rotational symmetry and time-reversal symmetry. The radial quantization generates the energy gap between neighboring bands. The states inside each band are characterized by their angular momentum over which the dispersions are suppressed by spin-orbit coupling and thus nearly flat and without Bloch-wave states. Surface states exhibit helical Dirac Fermi surfaces which are described by the Z2 index. Similar analysis in 2D shows the existence of topological insulators in the harmonic potential with strong Rashba spin-orbit coupling. These topological insulating states can be achieved from the dimensional reduction of the quantum Hall states in 3D and 4D flat space.

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