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The theoretical studies of topology electronic states in HgTe Hall Bar and Quantum Dot JIN-XIAN QU, SHU-HUI ZHANG, WEN YANG, Beijing CSRC — In recent years, there is an extensive attention on the new properties of topology materials and their potential applications. Our interest is on the physics in the quantum confined systems based on topology materials. To consider two such systems, i.e., quantum dot and Hall bar constructed on the HgTe quantum well, we study the electronic properties and their dependence on various material parameters with and without an in-plane electric field. For both systems, we find that 1) the exotic edge states appear in bulk energy gap, resulting from the non-trivial topological property of quantum well system. 2) by the magnetic doping, there are tunable phase transitions, e.g., transition from trivial insulating phase to topological insulating phase or anomalous quantum Hall insulating phase. 3) the in-plane electric field can introduce effective control on the electronic states.

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