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Transition in topological phase of Ge-Sb-Te and Ge-Bi-Te heterostructures JEONGWOO KIM, JINWOONG KIM, Department of Physics, Pohang University of Science and Technology, KI-SEOK KIM, Asia Pacific Center for Theoretical Physics, Pohang University of Science and Technology, SEUNG-HOON JHI, Department of Physics, Pohang University of Science and Technology — We studied the transition of topological phase of ternary chalcogenide compounds using first-principles methods. Our calculations show that they undergo a transition between band insulator and topological insulator phases upon the variation of atomic composition and layer thickness. In order to understand the transition, we developed a model Hamiltonian of 1D Dirac fermionic superlattice. We introduced to the Hamiltonian an effective interaction between Dirac fermions that is mediated by the electrons from the band insulating layers. We obtained the phase diagram of the transition as a function of materials parameters including layer thickness, band gap, and Dirac fermionic mass gap. We also discussed the implication of our ressults to the conducting properties of chalcogenide compounds

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