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Tight-binding model study of topological properties in few-layer black phosphorus[1] HYEONJIN DOH, HYOUNG JOON CHOI, Yonsei Univ — We study the simplest tight-binding model describing the band structures of mono- and bilayer phosphorus. The band structures are analyzed for various tight-binding parameters, and the gap-closing conditions are found where the system turns into a Dirac semi-metal. We show the tight-binding model Hamiltonian can be reduced to Dirac Hamiltonian and investigate its topological properties. The doping, electric field and pressure effects on topological properties of black phosphorus are discussed and these analyses suggest directions the the control of the energy gap in these system.

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Hyeonjin Doh
Yonsei Univ

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