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Beyond the semi-Dirac, semi-Weyl dispersion: extending the tight binding model YUNDI QUAN, WARREN PICKETT, Univ of California - Davis — Weyl semimetals with "Dirac points" have gained widespread notice due to the many unusual features they display, including topological characteristics. The discovery of the 2D semi-Dirac semimetal (more precisely, semi-Dirac, semi-Weyl) in thin VO_2 slabs with dispersion that is massless in one direction but massive perpendicular, provides an additional peculiarity introduces its own distinct behavior. We have generalized the two-band tight binding model for this system, obtaining new types of extreme bands and density of states. A specific feature is that the bottom of the upper band terminates at a contour (rather than at a point) such that electron doping leads to a pair of large, slightly separated Fermi lines and the DOS becomes 1D-like. Other unusual features will be described.

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