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Valley Physics in Tin (II) Sulfide ALEKSANDR RODIN, LIDIA GOMES, ALEXANDRA CARVALHO, ANTONIO CASTRO NETO, Natl Univ of Singapore — The field of 2D physics has experienced a rapid growth in recent years. Improved manipulation and growth techniques have resulted in isolation and characterization of novel materials with fascinating properties. A family of compounds that was described recently is transition metal monochalcogenides. Due to their non-trivial crystal structure, studying these materials is a challenging task. Using a combination of density functional theory (DFT) and analytical methods, we investigate the band structure of tin (II) sulfide, a naturally occurring material, to discover that SnS has two pairs of valleys positioned in perpendicular orientation to each other. DFT is employed to construct $\mathbf{k} \cdot \mathbf{p}$ Hamiltonians around each of the valleys. Finally, we show that these individual valley pairs can be separated using linearly polarized light or by utilizing the nonlinear current response, making SnS a candidate for valleytronic applications.

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