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Band Renormalization in Mn Doped TiS_2 TIMOTHY KIDD, PAUL SHAND, LAURA STRAUSS, University of Northern Iowa, JON RAMEAU, TONICA VALLA, PETER JOHNSON, Brookhaven National Laboratory — Titanium disulphide is a narrow gap semiconductor with a highly 2D layered structure. Mn dopants can be used to transform the band structure into being truly metallic via a rigid band shift of the electronic states. The system also begins to exhibit a variety of low temperature magnetic phases at Mn concentrations above 5%. We have performed angle resolved photoemission measurements of this system that clearly the transformation of the band structure from semiconducting to metallic. Furthermore, it can be seen that states near the valence band maxima become strongly modified beyond the rigid band shift approximation. The degeneracy of these states is lifted and they show behavior much like the spin splitting classically seen in surface states of gold and more recently in those of topological insulators. This behavior was quite unexpected as the states probed should be essentially bulk bands for this inert material. While no signs of temperature dependence were found to correlate these changes in electronic structure with any magnetic phase transition, it seems likely that this novel behavior arises from magnetic interactions with the Mn dopants.

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