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Thickness dependent Raman spectroscopy in 1T-TaS_2 RAHUL RAO, Honda Research Institute USA, MASA ISHIGAMI, JYOTI KATOCH, University of Central Florida, DARSHANA WICKRAMARATNE, ROGER LAKE, University of Carlifornia Riverside — Much attention has been paid recently to layered transition metal dichalcogenides (TMDs), which exhibit unique optical properties as their thickness is reduced from the bulk down to a monolayer. Here, we study Raman spectra of mono-and few-layered 1T-TaS_2, a metallic TMD, which is known to exhibit temperature-dependent commensurate and incommensurate charge density waves. We measure the low frequency Raman spectra of mechanically exfoliated 1T-TaS_2 on SiO_2 substrates with thicknesses ranging from 100 nm down to 1 nm. The room temperature Raman spectra exhibit numerous sharp peaks with frequencies below 100 cm^{-1}, which evolve with reducing thickness. Temperature and polarization dependence of the low frequency modes reveals the emergence of new in-plane and out-of-plane modes. Density functional theory calculations suggest the origin of these peaks to zone folding of the 1T-TaS_2 Brillouin zone. Acknowledgement: This work is based upon research supported by the National Science Foundation under Grant No. 0955625.

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