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The charge-density wave mechanism in the 2H transition metal dichalcogenides RYAN BARNETT, ANATOLI POLKOVNIKOV, EUGENE DEMLER, Harvard University — During recent years there has been a renewed interest in the transition metal dichalcogenides (TMDs) due to angle resolved photoemission spectroscopy (ARPES) studies. For instance, a saddle band in 2H-TaSe2 was measured around 10 meV below the Fermi energy, extending over large regions of the Fermi surface [1]. Despite the recent progress, however, the mechanism of the charge-density wave (CDW) has remained elusive and controversial for these materials. In another experiment, an intriguing shift of the peak of the quasiparticle self-energy as a function of temperature was observed in 2H-TaSe2 [2]. In this talk, we will address these recent experiments. Using the available ARPES data, we obtain a model for the band structure of these materials. With this model, we argue that the CDW is driven by Fermi surface nesting, but due to the high level of degeneracies at the zone boundaries, the Fermi surface is not gapped in the conventional way even for the commensurate CDW phase. By considering coupling to an optical phonon, we provide an explanation for the shift in the quasi-particle self-energy. Finally, we ways to extract information of the Fermi surface from STM experiments. [1] R. Liu et al., Phys. Rev. Lett. 80, 5762 (1998). [2] T. Valla et al. Phys. Rev. Lett 85, 4759 (2000).

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