Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Conductivity Modulation in a gated Normal-CDW-Normal configuration[1] SAUMYA BISWAS, ROGER LAKE, Univ of California - Riverside — There is considerable interest in switching by exploiting a voltage controlled phase transition, and one such phase is the charge density wave phase that occurs in a number of quasi one dimensional and two dimensional transition metal dichalcogenides. Voltage controlled switching of the charge density wave transition in 1T-TaS_2 has recently been demonstrated. We consider a transistor geometry with normal metal contacts and a channel of CDW material. The interaction is modeled with a negative U Hubbard term. Normal-CDW-temperature-U phase diagrams show the regime of the CDW in the ideal lattice. The wavelength of the CDW in the transistor channel is determined by both the conditions of Fermi surface nesting and also the condition of commensurability with the channel length between the two normal leads. Moving the Fermi level of the channel first results in phase boundaries within the CDW as the conditions of commensurability and Fermi surface nesting become incompatible. Moving the Fermi level from half filling by few tens of meV causes a collapsing of the CDW gap and an effective CDW-normal transition, leaving vestiges of the CDW in the channel. The transition is accompanied by one to two orders of magnitude increase in the conductivity.

[1]This work is supported by the National Science Foundation (NSF) Grant No. 1124733 and the Semiconductor Research Corporation (SRC) Nanoelectronic Research Initiative as a part of the Nanoelectronics for 2020 and Beyond (NEB-2020) program

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Date submitted: 06 Nov 2015 Electronic form version 1.4