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Hysteretic melting transition of a soliton lattice in $IrTe_2$[1] WEIDA WU, Department of Physics and Astronomy, Rutgers University, PIN-JUI HSU, TOBIAS MAUERER, MATTHIAS VOGT, MATTHIAS BODE, Physikalisches Institut, University of Wuerzburg, 97074 Wuerzburg, Germany, J.J. YANG, Laboratory for Pohang Emergent Materials and Department of Physics, POSTECH, Pohang 790-784, Republic of Korea, YOON SEOK OH, S-W. CHEONG, Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, Piscataway, New Jersey 08854, USA — We report on the observation of the hysteretic transition of a commensurate charge modulation in $IrTe_2$ from transport and scanning tunneling microscopy (STM) studies. Below the transition ($T_C \approx 275$ K on cooling) a $q = 1/5$ charge modulation was observed, which is consistent with previous studies [1,2]. Additional modulations [$q_n = (3n + 2)^{-1}$] appear below a second transition at $T_S \approx 180$ K on cooling. The coexistence of various modulations persist up to T_C on warming. The atomic structures of charge modulations and the temperature dependent STM studies suggest that 1/5 modulation is a periodic soliton lattice which partially melts below T_S on cooling. Our results provide compelling evidence that the ground state of $IrTe_2$ is a commensurate 1/6 charge modulation, which originates from periodic dimerization of Te atoms visualized by atomically resolved STM images [3]. [1] Yang, *et al.*, Phys. Rev. Lett. 108, 116402 (2012). [2] Oh, *et al.*, Phys. Rev. Lett. 110, 127209 (2013). [3] Hsu, *et al.*, arXiv:1311.3015, (2013).

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