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Evidence for a magnetic metallic R phase in Vanadium dioxide VO₂ HUI XING, PAYAM TAHERI, PEIHONG ZHANG, HAO ZENG, Department of Physics, The State University of New York at Buffalo — Vanadium dioxide VO₂ has garnered extensive research interests for over decades due to its metal-insulator transition (MIT) around 340 K (Ref. 1). Much is known for the physics behind the MIT (including a correlated structural transition and the involvement of several intermediate states). On the other hand, the magnetic property across the MIT is much less known. Although there are no fundamental arguments against the possibility of forming local magnetic moments in VO₂. So far, only the M2 phase has been confirmed to possess local magnetic moments. However, our temperature-dependent magnetic susceptibility measurements of VO₂ show a sudden jump at the MIT that cannot be attributed to a simple Pauli susceptibility from conducting electrons. In a recent paper², we pointed out local magnetic moments may form in the metallic R phase. The formation of local moment would naturally explain the extremely high magnetic susceptibility of VO₂ above the phase transition temperature. We further discuss the magnetoresistance (MR) measured across the MIT, which shows different magnitude and field dependence in M1 and R phase, including the MR in the metallic phase suppressed to lower temperature in a VO₂ electric double layer transistor device using ionic liquid as gate dielectrics. 1. F. J. Morin, Phys. Rev. Lett. 3, 34 (1959). 2. Xun Yuan et al., Phys. Rev. B 86, 235103 (2012).

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