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Measurement of the quantum capacitance of two-dimensional vanadium dioxide films ZHE WU, TALBOT KNIGHTON, VINICIO TARQUINI, JIAN HUANG, Department of Physics and Astronomy, Wayne State University, NELSON SEPÚLVEDA, Department of Electrical and Computer Engineering, Michigan State University, DEPARTMENT OF PHYSICS AND ASTRONOMY, WAYNE STATE UNIVERSITY COLLABORATION, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, MICHIGAN STATE UNIVERSITY COLLABORATION — With a homebuilt ac bridge, we have performed capacitance measurement of quasi two-dimensional vanadium dioxide films grown on silicon-dioxide/p-doped silicon substrate. The out-phase-signal, which corresponds to the resistivity variation, is superior to the four-terminal measurement result of the temperature dependence of the resistivity which varies by four orders of magnitude from 360K to 310K. The hysteretic behavior shows an overlap of two distinctive features that indicate a shifted structural transition relative to the Mott transition. In addition, the quantum capacitance is obtained through the in-phase signals so that $d\mu/dn$, the inverse of the density of states, is determined as a function of temperature. This has resulted in a diverging compressibility below the critical temperature by four orders of magnitude, consistent with a Mott transition influenced by Peierls transition.

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