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Orbital-assisted metal-insulator transition in VO_2 M.W. HAVERKORT, II. Physikalisches Institut, Universität zu Köln, Germany, Z. HU, II. Physikalisches Institut, Universität zu Köln, Germany, A. TANAKA, Department of Quantum Matter, ADSM, Hiroshima University, Japan, W. REICHELT, Institut für Anorganische Chemie, Technische Universität Dresden, Germany, S. V. STRELTSOV, Institute of Metal Physics, Ekaterinburg, Russia, M. A. KOROTIN, Institute of Metal Physics, Ekaterinburg, Russia, V. I. ANISIMOV, Institute of Metal Physics, Ekaterinburg, Russia, H. H. HSIEH, Chung Cheng Institute of Technology, Taoyuan, Taiwan, H.-J. LIN, National Synchrotron Radiation Research Center, Hsinchu, Taiwan, C. T. CHEN, National Synchrotron Radiation Research Center, Hsinchu, Taiwan, D. I. KHOMSKII, II. Physikalisches Institut, Universität zu Köln, Germany, L. H. TJENG, II. Physikalisches Institut, Universität zu Köln, Germany — We found direct experimental evidence for an orbital switching in the V $3d$ states across the metal-insulator transition in VO_2. We have used soft-x-ray absorption spectroscopy at the V $L_{2,3}$ edges as a sensitive local probe, and have determined quantitatively the orbital polarizations. These results strongly suggest that, in going from the metallic to the insulating state, the orbital occupation changes in a manner that charge fluctuations and effective band widths are reduced, that the system becomes more 1-dimensional and more susceptible to a Peierls-like transition, and that the required massive orbital switching can only be made if the system is close to a Mott insulating regime.

Maurits Haverkort
II. Physikalisches Institut, Universität zu Köln, Germany

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