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Inelastic Neutron Scattering studies of pure and Mo doped VO_2[1]

ARNAB BANERJEE, GARRETT E. GRANROTH, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge TN 37830 USA, YUEN YIU, Department of Physics, University of Tennessee, Knoxville TN 37996 USA, ADAM A. ACZEL, ALEXANDER I. KOLESHNIKOV, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge TN 37830 USA, HUXIA LUO, ROBERT J. CAVA, Department of Chemistry, Princeton university, Princeton NJ 08544 USA, STEPHEN E. NAGLER, Quantum Condensed Matter Division, Oak Ridge National Laboratory, Oak Ridge TN 37830 USA, SEQUOIA TEAM, PRINCETON UNIVERSITY COLLABORATION — For the last half-century VO_2 has been viewed as an archetypal system for studying the metal-insulator transition (MIT). Moreover, there is currently intense interest in this material arising from its promising use in fast energy efficient electronic devices. There are key unresolved issues connected with the origin of the MIT, including the role of magnetism arising from the S=1/2 V^{4+} ions. It is known that below 340 K in undoped VO_2 the V ions form structural dimers in the insulating M1 monoclinic phase. Here we report the results of new inelastic neutron scattering measurements of VO_2 and $V_{0.75}Mo_{0.25}O_2$. Using the SEQUOIA chopper spectrometer at the SNS possible lattice and magnetic excitations for energies up to 600 meV were investigated. We discuss the results in the context of current ideas concerning the MIT in VO_2.

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Arnab Banerjee
Quantum Condensed Matter Division, Oak Ridge National Laboratory,
Oak Ridge TN 37830 USA

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