The metal-insulator transition in the prototype Mott-Hubbard compound $(V_{1-x}Cr_x)_2O_3$

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The Mott metal-insulator transition due to electron correlations is one of the most basic and relevant phenomena in condensed matter physics. The Hubbard model captures the essential physics of it, by describing the competition between electron hopping and Coulomb repulsion. Over the decades, vanadium sesquioxide (Cr-doped V_2O_3) has emerged as a prototype material for the study of Mott physics, and a privileged test-bed for the validity and the limits of the various theoretical methods based on the Hubbard model.

The celebrated simplicity of the phase diagram of $(V_{1-x}Cr_x)_2O_3$ makes it possible to study very fundamental questions concerning the metal-insulator, like the interplay among electronic, structural and spin degrees of freedom; at the same time, it is also one of the favorite playgrounds to explore more applied and functional perspectives, like its evolution on the microscopic scale or its manipulation with external stimuli like light pulses. In this talk, the main results obtained over the years in the study of this archetype system will be reviewed, with particular emphasis on the most recent ones.