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Hole-lattice Coupling and Photo-induced Insulator-metal Transition in VO2 PEIHONG ZHANG, Physics Department, University at Buffalo, SUNY, XUN YUAN, WENQING ZHANG, Shanghai Institute of Ceramics,CAS — In this talk, we will present a theory [PRB **88**, 035119 (2013)] that is able to explain the photo-induced insulator-metal transition in VO2 and the related transient and multi-time-scale structural dynamics upon photo-excitation. Holes created by photo-excitation weaken the V-V bonds and eventually break V-V dimers in the M1 phase when the laser fluence reaches a critical value. The breaking of the V-V bonds in turn leads to an immediate electronic phase transition from an insulating to a metallic state while the crystal lattice remains monoclinic in shape.

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