FACOLTÀ DI SCIENZE MATEMATICHE, FISICHE E NATURALI
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TOWARD COHERENT OPTICAL CONTROL OF THE INSULATOR-TO-METAL TRANSITION IN V_2O_3

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Abstract:
Multi-band correlated materials represent an intriguing class of solid-state systems which recently experienced an increasing scientific and technological interest triggered by the development of the next generation devices characterized by novel functionalities and ultrafast speed. In particular, the electronic structure of these materials consists in multiple bands of different orbital origin and leads to a variety of remarkable phenomena, such as insulator-to-metal phase transitions (IMT). In the case of vanadium sesquioxide (V_2O_3), a Mott insulator which undergoes a first-order IMT at TIMT ˜ 160 K, this solid-solid transformation has been intensively studied due to the possibility to control the Mott transition by means of small variations of chemical doping, temperature, and pressure. Recently, a new excitation pathway to photo-induce the transition has been introduced. Indeed, by changing the orbital population difference by means of a laser excitation, the system can be driven from the insulating to a metastable (non-thermal) metallic phase. Within this framework, we investigated the IMT in V2O3 through an interferometric experiment in which the system is excited by two delayed and phase-coherent pump pulses. The resulting coherently manipulated population of the metallic metastable state is probed by a third optical pulse. This method represents a potential protocol to access the coherence properties in solid-state systems near IMT.

Webinar

Mercoledì 3 febbraio 2021, ore 17.15

Fai clic qui per partecipare alla riunione su Microsoft Teams

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