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TeraHertz pump/Optical probe experiments on vanadium sesquioxyde (V_2O_3) thin films in the Paramagnetic Metallic phase

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Vanadium sesquioxyde is the working horse in the study of Mott-Hubbard phase transitions. At ambient pressure, it presents a first order non-isostructural paramagnetic metallic to antiferromagnetic insulating phase transition near 160K, while a third insulating phase can be obtained by changing pressure or doping. The ultrafast response of such materials to pump-probe experiments are very important both for the understanding of the underlying physics, and to potential applications. In particular, optical pump experiments [1, 2] have shown the possibility of inducing metallic nucleation-growth from the low-temperature insulating phase, while very high terahertz-pump fields (>1MV/cm) at 4K achieved insulating to metal transition through electronic tunneling [3].

In this presentation, we report TeraHertz pump/Optical probe results performed on a V_2O_3 thin film in the metallic phase, at ambient temperature. After the TeraHertz pulse excitation, the optical transmission changes over more than 200ps, and depends both on TeraHertz pump power, and probe wavelength. These results are interpreted using thermoelastic wave models [4, 5], and discussed in view of the role of non-resonant TeraHertz pulsed excitations of thin films.

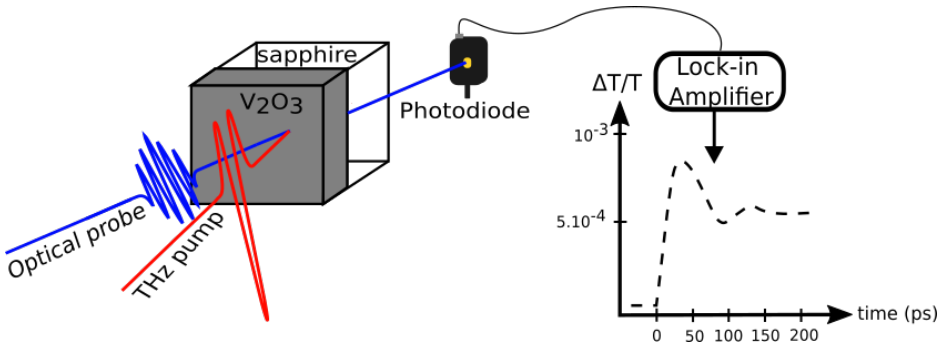

Figure: Scheme of the TeraHertz pump Optical probe experiment performed on V_2O_3 thin film

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