FACOLTÀ DI SCIENZE MATEMATICHE, FISICHE E NATURALI
DIPARTIMENTO DI MATEMATICA E FISICA "NICCOLÒ TARTAGLIA"

Introduce: Selene MOR, Università Cattolica del Sacro Cuore

Intervengono:

Dr. Christopher W. NICHOLSON, University of Fribourg (Switzerland)

USING RESONANT INELASTIC X-RAY SCATTERING TO PROBE QUANTUM MATERIALS IN- AND OUT-OF-EQUILIBRIUM

The study of emergent phenomena in quantum materials continues to produce exciting results and fundamental insights. In order to untangle the coupled degrees of freedom responsible for such behaviour requires a range of approaches and techniques. A powerful method that has developed rapidly over the last 20 years is resonant inelastic X-ray scattering (RIXS) [1], which harnesses the power of synchroton sources to probe a range of properties, from collective phonons and magnons, to local crystal symmetries. Recent developments in the field include extending the RIXS technique into the femtosecond domain using X-ray free electron laser (XFEL) sources, further exploiting its potential to probe complex behaviour. In this presentation I will demonstrate some of the versatility of the RIXS technique by briefly addressing two material systems. In the first case I will present RIXS data on superconducting oxide thin films that display interfacial charge ordering [2]. Comparing data obtained under different scattering conditions reveal this order has an unusual orbital symmetry, which contrasts with previous observations in the cuprates. The presence of tuneable interfacial charge transfer implies that interface engineering may allow direct control over this and similar behaviour. In the second case I will show femtosecond RIXS results from a magnetically frustrated insulator. In these challenging experiments, excitation across the charge gap produces a reduction of localised spin correlations that cannot be fully explained by a purely thermal heating of the lattice, hinting at the decoupling of lattice and magnetic channels on ultrafast timescales. These results help set the scene for future investigations at next generation XFEL facilities currently under development.

[1] Ament et al., Rev. Mod. Phys. 83, 705 (2011)
[2] Gaina et al, arXiv:2007.15894 (2020); in press at npj Quantum Materials (2021)

Dr. Elia RAZZOLI, Paul Scherrer Institute Zürich (Switzerland)

ULTRAFAST DYNAMICS OF QUANTUM MATERIALS AT FURKA ENDSTATION

Over the last few years Free Electrons Lasers (FEL) have developed as a powerful tool to perform ultrafast spectroscopy in the XUV, Soft- and Hard- X-ray. The soft X-ray branch of SwissFEL, called Athos, will be ready for user operation in the second half of 2021 and will includes an innovative layout aiming to go beyond the standard self-amplified spontaneous emission (SASE) operation. In this talk, after introducing the various unique operation modes of Athos, I will focus on the description of its condensed matter experimental endstation, which is named Furka. Furka will be dedicated to time-resolved X-ray absorption (TR-XAS), resonant X-Ray diffraction (TR-RXRD) and Resonant Inelastic X-ray Scattering (TR-RIXS) experiments to study correlated and quantum materials. In particular, the new scientific opportunities opened by high-energy resolution tr-RIXS experiments at Furka will be discussed.

Webinar

Venerdì 29 gennaio 2021, ore 10.30

Fai clic qui per partecipare alla riunione su Microsoft Teams

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