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# “Femtosecond spin dynamics and nanoscale X-ray imaging in correlated materials”

**Prof. Simon Wall**

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The Barcelona Institute of Science and Technology)**

日時：平成28年6月13日(月) 10:30-12:00

場所：東京大学理学部1号館2階201A

## Abstract

The coupling between electrons, spins and phonons is vital for understanding the properties of correlated materials and the interesting phenomena they exhibit, such as high temperature superconductivity. However, many correlated materials are antiferromagnetic, which poses significant challenges for how to observe such coupling.

In this talk I will discuss two techniques that our group has been using in order to understand these interactions. The first technique is non-linear optics, which we use to understand the coupling between electrons, phonons and spins in the insulating antiferromagnet  $\text{Cr}_2\text{O}_3$  [1]. The second is time-resolved resonant inelastic X-ray scattering which enables us to measure the dynamics of spin waves on the nanoscale in  $\text{Sr}_2\text{IrO}_4$  [2].

Finally, if time permits, I will discuss our recent attempts to perform resonant X-ray spectroscopy on the nanoscale by exploiting X-ray holography. This enables us to image nanoscale phase separation in strongly correlated materials.

## References

- [1] V. G. Sala et al. arXiv:1509.09214
- [2] M. Dean et al. *Nature Materials* **15**, 601-605 (2016)

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