

# Magnetic- and Orbital-Excitations in 4d Transition Metals

H. Gretarsson<sup>1,2</sup>, H. Suzuki<sup>1</sup>, J. Bertinshaw<sup>1</sup>, H. Yavas<sup>2,3</sup>, B. Keimer<sup>1</sup>

<sup>1</sup>Max-Planck-Institut für Festkörperforschung, Heisenbergstr. 1, D-70569 Stuttgart, Germany,

<sup>2</sup>Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, D-22607 Hamburg, Germany,

<sup>3</sup>SLAC National Accelerator Laboratory, 2757 Sand Hill Rd., Menlo Park, CA 94025, USA

**hlynur.gretarsson@desy.de**

In this talk I will address our interest in the 4d transition metals. In particular focus will be given to the Ru-based materials, where the presence of comparable energy scales, namely spin-orbit coupling (SOC), on-site Coulomb repulsion (U), and the crystal electric field (CEF) can give rise to non-trivial ground states [1,2]. I will demonstrate that by utilizing the well-known technique Resonant Inelastic X-Ray Scattering (RIXS) in the tender X-ray range [3] one can probe directly the key parameters and their interplay in these materials. Two examples of magnetic compounds will be given, the honeycomb-lattice SrRuO<sub>6</sub> [4] and the square-lattice Ca<sub>2</sub>RuO<sub>4</sub> [5]. In the former the relatively strong nearest-neighbour exchange allows us to observe a magnon with a bandwidth of close to 200 meV, while in the latter the orbital excitations reflect its unusual magnetism. These two examples demonstrate the importance of Ru L<sub>3</sub>-edge RIXS in exploring magnetic- and orbital-excitations in ruthenates and encourage further improvements in instrumentation.

## References

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