IST AUSTRIA
Institute of Science and Technology

# Physical Sciences Seminar

# Competing electron-electron correlations, spin-orbit coupling, and spin-lattice coupling in iridates: how to use them to tune magnetic interactions and charge gap

**Ekaterina Pavarini (IST Austria)**

**Host: Mikhail Lemeshko**

Iridates are an exciting family of Mott insulators due to the competition of different equally strong fundamental interactions observed in them: electron-electron correlations, spin-orbit coupling (SOC), and spin-lattice coupling. Moreover, exploring the physics of the iridates is expected to shed light onto high-temperature superconductivity, as quasi-two-dimensional square lattice iridium oxides such as Sr2IrO4 have strong structural and electronic similarities to the famous superconducting 3d family of copper oxides. However, surprisingly no superconductivity has been reported in iridates so far.

After introducing this interesting family of strongly correlated materials in some detail, I will present our recent theoretical advances in understanding charge and magnetic excitations, as revealed by Photoemission Spectroscopy (ARPES) and Resonant Inelastic X-ray scattering (RIXS). In 2018, it was discovered that in iridates, SOC mediates unusual almost rigid locking of the magnetic momenta to the lattice through the orbital momenta. Therefore, tuning the local crystal environment emerges as a new route to control structural and physical properties. I will discuss how magnetic and electronic degrees of freedom can be manipulated by applying external pressure and strain, as discovered recently using RIXS and two-magnon Raman scattering, and how do we understand it from the theoretical perspective.

## Tuesday, February 4, 2020 11:00am - 12:00pm

IST Austria Campus Heinzel Seminar Room / Office Bldg West (I21.EG.101)

This invitation is valid as a ticket for the IST Shuttle from and to Heiligenstadt Station. Please find a schedule of the IST Shuttle on our webpage: https://ist.ac.at/en/campus/how-to-get-here/ The IST Shuttle bus is marked IST Shuttle (#142) and has the Institute Logo printed on the side.