



## ICTS Seminar

**Title** : Spin-Orbit Coupling and the consequent Novel phases in Correlated Iridates

**Speaker** : Sugata Ray (Indian Association for the Cultivation of Science, Kolkata)

**Date** : Tuesday, July 13, 2021

**Time** : 3:00 pm (IST)

**Abstract** : Spin-orbit coupling (SOC) is a relativistic effect that links the orbital and spin angular momenta of an electron. The natural place to find significant SOC is in atoms with high atomic numbers, moving down the rows of the periodic table into the heavier elements, and here, we take a series of Iridium based oxides as our probing point. There are several energy scales to consider in such materials: the electron correlation or the on-site Hubbard interaction  $U$ , Hund's coupling  $J_H$ , the SOC  $\lambda$ , the crystal field  $\Delta$ , and the electron kinetic energy described by hopping integral  $t$ , and the competition among them may give rise to interesting magnetic and electronic ground states.

Additionally, we focus on hexagonal structures which allow for face-sharing of metal-oxygen octahedra or trigonal prisms within their structural frameworks. With such systems we add another interesting feature of geometrical frustration which is of contemporary interest due to its potential in affecting the ordering of magnetic moments or orbital occupancies at low temperatures, which is especially relevant to their significance as quantum materials. As such, several hexagonal oxide perovskites have been identified as potential candidates for hosting the quantum-spin-liquid state at low temperatures. Overall, combining these two, I would like to discuss certain interesting features of hexagonal and frustrated iridates with a focus on quantum spin-liquid ground state.

Our works that I would mention in the presentation are mostly carried out by Abhishek Nag, Abhisek Bandyopadhyay, Indra Dasgupta, Tanusri Saha-Dasgupta, Avinash Mahajan, Fabrice Bert, Marco Moretti Sala, and Carlo meneghini.

**Venue** : Please click on the below link to join the meeting

<https://us06web.zoom.us/j/83319844961?pwd=VFRTbTJiWE9Sd08yZlV4M21oTjVZOT09>

Meeting ID: 833 1984 4961

Passcode: 011145