Workshop on Frontiers in Quantum Materials

September 1 – 5, 2025

ICTP-SAIFR, São Paulo, Brazil

Venue: Principia Institute

ID: 862 8678 4162
Password: quantum

GROUP 1 (Monday and Thursday)

- **Farinas, Pedro Sanchez** (IFSC, USP, Brazil): *Effects of dissipation and disorder in systems with multiple order parameters and continuous symmetry*

The effects of disorder in phase transitions are often studied in closed systems, where it leads to different and unexpected behavior of matter, such as Griffiths singularities, infinite-randomness criticality, and glassy behavior, to name a few. Because real materials are seldom closed systems, it is important to understand how the phase diagram of a system changes when coupled with other degrees of freedom. The combined effects of quenched disorder and Ohmic dissipation have been investigated for systems with continuous O(N) symmetry by Hoyos et al. (1,2). Their findings reveal that the phase transition is governed by an infinite-randomness fixed point, belonging to the same universality class as the random transverse-field Ising model. We aim to extend this framework to phase transitions involving multiple order-parameter fields, as the combined effects of dissipation and disorder remain largely unexplored in such cases. The study of systems with multiple order-parameter fields is particularly relevant in the context of iron-based superconductors, where phase transitions involve both s-wave and d-wave superconducting order parameters. Understanding how disorder and dissipation affect these transitions can provide valuable insights into the critical behavior of these materials, which remain an active area of research.