Opportunities to probe correlated materials with soft X-ray RIXS at Sirius

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Ultimately it is the excitations that tell us everything we want to know about the behavior of a system. Particularly, in strongly correlated systems, electrons have couplings of the charge, lattice, spin and orbital degrees of freedom that give rise to an enormous variety of collective excitations and quasi particles, ranging from the well-known phonons and magnons to the more exotic spinons and orbitons. Because of the incredible range of momentum and energy scales of interest, different probes must be used to study these excitations. Most knowledge about excitations in condensed matter, with few notable exceptions, came from scattering experiments using thermal neutrons or visible light. It was only in the past ten years, that inelastic X-ray scattering (IXS) have been systematically used to study condensed matter excitations. This valuable tool will be soon available to the Brazilian community at the IPE beamline of Sirius, the 4th generation synchrotron source under construction in Campinas. In this seminar, we will present an introduction to IXS methods with particular attention to the resonant inelastic X-ray scattering technique (RIXS). We will discuss the basic aspects of the techniques using selected examples from the literature and present the current status of the development of the beamline, spectrometer and associated instrumentation.