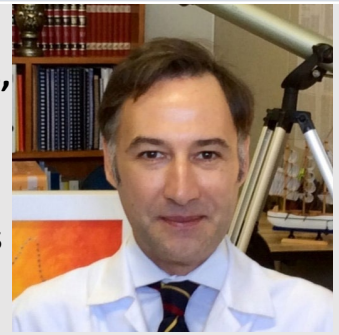
4 **Webinar Series** | **UNESCO-UNISA Africa Chair in Nanoscience & Nanotechnology (U2ACN2)**

Strongly correlated electrons in molecular conductors, Mott criticality, and the Grüneisen parameter

Over the last decades, it has become clear that electronic correlation effects can give rise to exotic manifestations of matter. Examples include Mott and charge-ordered phases, superconductivity, and various types of long-range magnetic ordering. Molecular conductors have served as an appropriate playground for exploring such exotics manifestations of matter. The so-called 'Mott insulators', having an odd number of conduction electrons per unit cell, according to band theory, should be metals. That this is not the case is due to the same order of magnitude of the hopping terms and the on-site Coulomb repulsion (“Hubbard parameters"). Interestingly enough, superconductivity can be induced by applying moderate hydrostatic pressure. In this presentation, fundamental aspects of Mott Physics, classical/quantum critical phenomena, and the Grüneisen parameter, including the breakdown of the Grüneisen ratio near a finite-temperature critical endpoint, are reviewed. Further perspectives are discussed as well.

Mariano de Souza
Professor of Physics, São Paulo State University, Brazil.



His research focuses on understanding variously correlated electronic phenomena, including superconductivity, Mott Physics, and quantum criticality. In 2011, he received the Werner Marttiensen Prize in recognition of his contribution to the field of Fe-based superconductors. His achievements and teaching activities have been recognized through numerous national and international honors such as from The State of Sao Paulo Research Foundation and the Austria Academy of Science.

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