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# Colóquio de Física

CFUM, LIP-Minho, DF

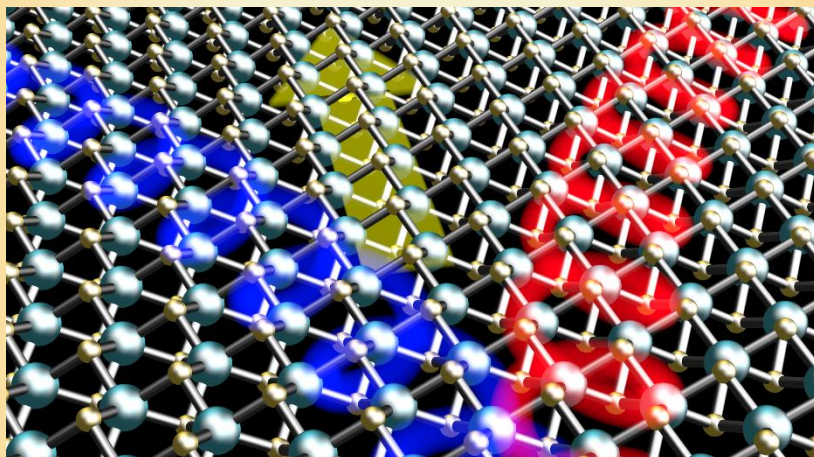
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**Quarta-Feira, 27 de setembro às 16h**  
**Anfiteatro de Física, Escola de Ciências, Gualtar**

## **Orbitronics Unveiled: From Fundamentals to Two-Dimensional Materials**

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### **Resumo:**

In this colloquium, we introduce the evolving field of orbitronics, which offers novel pathways for advancing information processing technologies. Unlike spintronics, which relies on the interconversion of charge and spin for data transfer and storage, and necessitates materials with robust spin-orbit coupling (SOC), often derived from scarce and environmentally problematic elements, orbitronics takes a different approach. It harnesses the often-overlooked orbital angular momentum of electrons in solids, presenting an attractive alternative to spintronics.

Within this framework, we explore various orbitronics phenomena analogous to their spintronics counterparts, such as the orbital Hall effect (OHE), akin to the spin Hall effect (SHE) but rooted in the manipulation of orbital degrees of freedom. Shifting our focus, we discuss the specific context of 2D materials, with a particular emphasis on monolayers and bilayers of transition metal dichalcogenides (TMDs) like MoS<sub>2</sub> and WSe<sub>2</sub>. These materials reveal intriguing characteristics, including the manifestation of the OHE in their insulating phase.