Walter Kohn Prize Lecture

"**Exploring Altermagnetism Through *Ab-Initio* Calculations**".
Speaker: Professor Rafael Gonzalez HERNANDEZ (Universidad del Norte, Colombia)

Antiferromagnetic spintronics has emerged as a dynamic and rapidly evolving field within condensed matter physics. Recent breakthroughs have revealed magnetic order in momentum space, leading to the discovery of a novel magnetic phase that transcends traditional ferromagnetism and antiferromagnetism: altermagnetism [1]. Altermagnetic materials are distinguished by their unconventional spin-polarized band structures in reciprocal space, which results from local sublattice anisotropies. This unique band structure enables remarkable phenomena, such as the spin-splitter effect [2] and the spontaneous Hall effect [3], while offering advantageous features for spintronic applications, including spin-polarized currents and terahertz spin dynamics. Furthermore, *ab-initio* electronic structure simulations, particularly density functional theory, play a crucial role in accurately predicting the properties of altermagnets. This talk will provide a comprehensive overview of altermagnetism and its implications for spintronics, emphasizing its potential to transform the landscape of magnetic materials and devices.

[1] Libor Šmejkal, Jairo Sinova and Tomas Jungwirth, *Phys. Rev. X 12, 031042 (2022)*
[2] Rafael González-Hernández, Libor Šmejkal, Karel Výborný, Yuta Yahagi, Jairo Sinova, Tomáš Jungwirth, and Jakub Železný, *Phys. Rev. Lett. 126, 127701 (2021)*
[3] Libor Šmejkal, Rafael González-Hernández, T. Jungwirth and J. Sinova, *Sci. Adv. 6, 23 (2020)*