

On-line SPICE-SPIN+X Seminars



Wednesday, 15th February 2023, 15:00 (CET)

The seminar will be via Zoom ([Meeting ID: 843 8506 3119](#)) and live streamed in the SPICE YouTube Channel.

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A stride down the quantum materials roadmap



Lately, condensed matter physics has witnessed the emergence of material systems in which quantum effects persist over a wide range of energy and length scales [1]. Such quantum materials include, among others, topological insulators, topological crystalline insulators, magnetically doped topological quantum materials, superconductors, 2-dimensional (2D). van der Waals, Kitaev and spin-orbit systems [2]. Here, the striking properties of quantum materials will be highlighted through a collection of relevant examples overarching the Rashba spin-orbit coupling in wurtzite n-GaN:Si [3,4] and the intriguing electronic properties of the magnetically doped topological crystalline insulator SnTe [5] and of the intrinsic ferromagnetic topological insulator MnSb₂Te₄. Striding further down the quantum materials road, the emergence of quantum chiral anomaly in 2D Weyl semimetal Td-WTe₂ with a record temperature of 100 K will be addressed [6]. Moreover, a bosonic island percolation model for Fe-doped superconducting NbN thin films will be presented [7]. Finally, an outlook of emergent phenomena in hybrid quantum structures with particular attention to topology, symmetry, spin-orbit coupling and superconductivity will be provided.

- [1] B. Keimar et al. Nat. Phys. 13, 1045 (2017)
- [2] F. Giustino et al. J. Phys. Mater. 3, 042006 (2020)
- [3] W. Stefanowicz et al. Phys. Rev. B 89, 205201 (2014)
- [4] R. Adhikari et al. Phys. Rev. B 94, 085205 (2016)
- [5] R. Adhikari et al. Phys. Rev. B 100, 134422 (2019)
- [6] R. Adhikari et al. Nanomaterials 11, 2755 (2021)
- [7] R. Adhikari et al. Nanomaterials 12, 3105 (2022)