



The IQARO (Spin-orbitronic QuAntum bits in Reconfigurable 2D-Oxides) project hosts a series of monthly seminars to communicate the work being done as part of the project. The seminars will feature presentations from IQARO partners from across all areas of the project, followed by a brief Q&A.

The next seminar will take place on **Friday, 13rd of December at 11:00 a.m.**

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Berry curvature effects on transport at (111) oxide interfaces

Abstract:

Quasi-Two Dimensional Electronic Gases (2DEGs) formed at oxide interfaces exhibit intriguing quantum phenomena, due to the effect of inversion symmetry breaking, electronic confinement, and strong spin-orbit coupling. These effects are especially peculiar at trigonal interfaces, where the electronic band structure reflects the crystalline C_{3v} symmetry, with a multi-band structure due to the near-degeneracy of the t_{2g} orbitals close to the Gamma point. This multi-band structure implies a strong hybridisation among the near-degenerate bands, leading to multiple effects in which the Berry curvature plays the main role. These effects include gate-tunable, dissipationless [1] and non-linear [2] transport and magneto [3] transport phenomena. Here we introduce the general model for (111) 2DEGs at oxide interfaces using a tight-binding framework, within which we determine the Berry curvature. We discuss how the Berry curvature affects the transport phenomena, finally showing some recent predictions and experimental comparisons for the transport at (111) $\text{LaAlO}_3/\text{SrTiO}_3$, $\text{LaAlO}_3/\text{KTaO}_3$, and $\text{LaAlO}_3/\text{EuTiO}_3/\text{SrTiO}_3$ interfaces.

[1] M. Trama, V. Cataudella, C. A. Perroni, F. Romeo, and R. Citro, *Physical Review B*, vol. 106, 075430, 2022

[2] J. Zhai, M. Trama, H. Liu, Z. Zhu, Y. Zhu, C. A. Perroni, R. Citro, P. He, and J. Shen, *Nano Letters*, vol. 23, 24, pp. 11892–11898, 2023

[3] Y. Chen, M. D'Antuono, M. Trama, D. Preziosi, B. Jouault, F. Teppe, C. Consejo, C. A. Perroni, R. Citro, D. Stornaiuolo, M. Salluzzo, *Advanced Materials*, 2410354, 2024

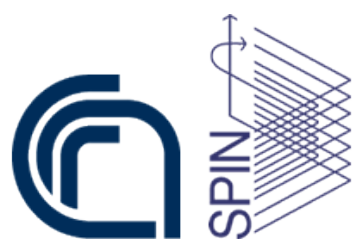
Zoom link:

<https://us02web.zoom.us/j/87919153292?pwd=nU5voaTKV5t1QmZhqDbGX1cTygiwau.1>

Meeting ID: 879 1915 3292

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for more information about the project: www.iqaro.eu



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