




## Superconducting Nickelates Prof. Araceli Gutiérrez

 Universidad  
Rey Juan Carlos

**Thursday, September 5, 2024**

**12:15 p.m. - CiQUS Seminar Room**

**Prof. Araceli Gutiérrez**

Universidad Rey Juan Carlos

### Abstract

The first observation of superconductivity at relatively high temperature in epitaxial thinfilms of infinite-layer (IL) nickelates upon hole doping was a significant breakthrough in the field of unconventional superconductivity (D. Li et al., Nature 572, 2019). This discovery was driven by the decades-long search of cuprate-like physics in other strongly correlated metallic oxides and generated at first intense interest. Further progress in the field crucially depends on the synthesis of high quality superconducting (SC) nickelate samples, which can provide reliable experimental data. However, their synthesis poses considerable challenges, largely hindering experimental research on this new class of oxide superconductors. That synthesis is achieved in a two-step process that yields the most thermodynamically stable perovskite phase first, then the IL phase by topotactic reduction, the quality of the starting phase playing a crucial role. We have recently accomplished the synthesis of SC IL praseodymium nickelate thin films (A. Gutiérrez-Llorente et al., Advanced Science 11, 2024). From these results, I will discuss the importance of the combined optimisation of both steps of the synthesis and analyse the transport properties of the incompletely reduced films, offering insight into the reduction process. These results contribute towards the goal of yielding high quality superconducting nickelate samples that could push forward experimental research on the field.

### Biosketch

Araceli Gutiérrez-Llorente is Associate Professor (Profesora Titular) at Universidad Rey Juan Carlos (URJC, Madrid, Spain). She graduated in Physics from Universidad Autónoma de Madrid, and obtained her PhD at the same university. A. Gutiérrez-Llorente carried out her postdoctoral research at Université Pierre et Marie Curie (Paris, France) founded by the European Union through a Marie Curie Individual Fellowship, and joined later URJC as a Ramón y Cajal researcher. Recently, from February 2022 to January 2024, she has conducted her research at Laboratoire Albert Fert (CNRS, Université Paris Saclay, France) financed by the European Union. Her work focuses on complex oxide epitaxial thin films and heterostructures in search of novel functionalities.