

Simon
Jöhr



Annabella
Drewanowski



Jonathan
Spring



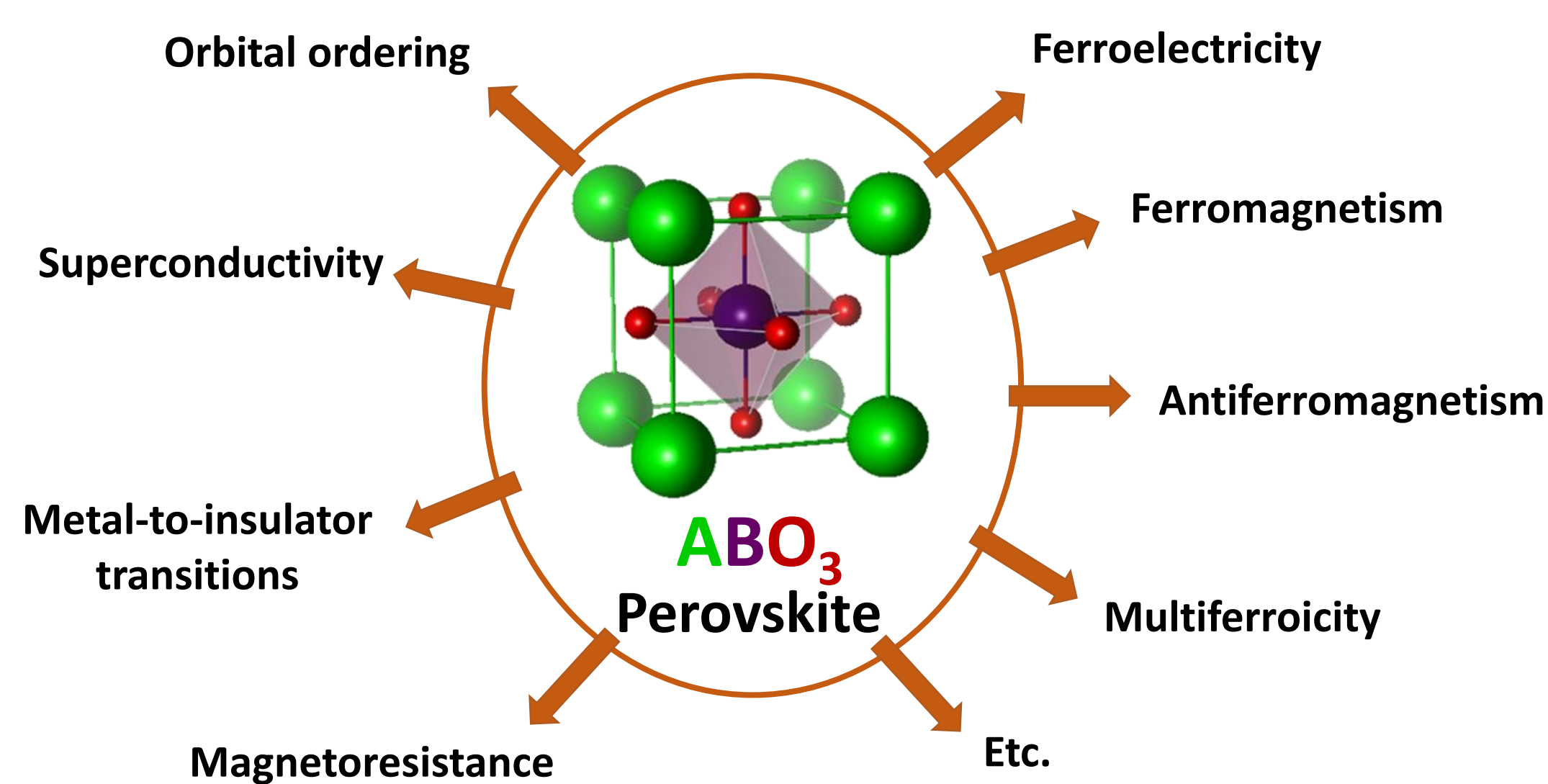
Marta
Gibert



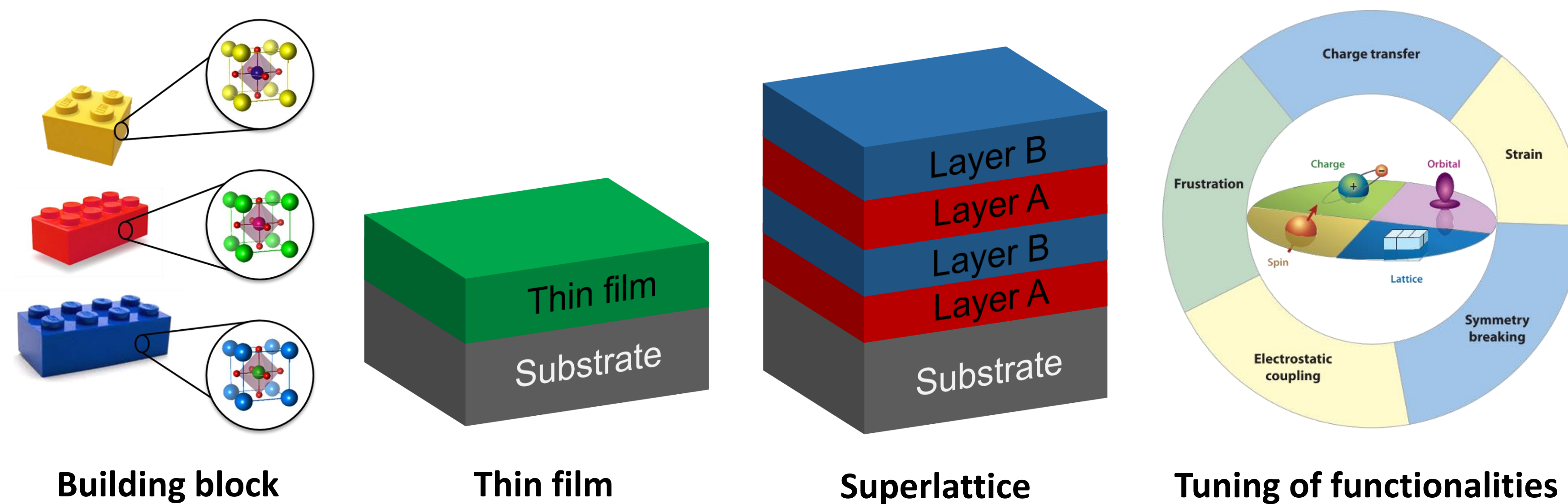
<https://www.physik.uzh.ch/en/groups/gibert.html>

Introduction: Why Oxide Interfaces?

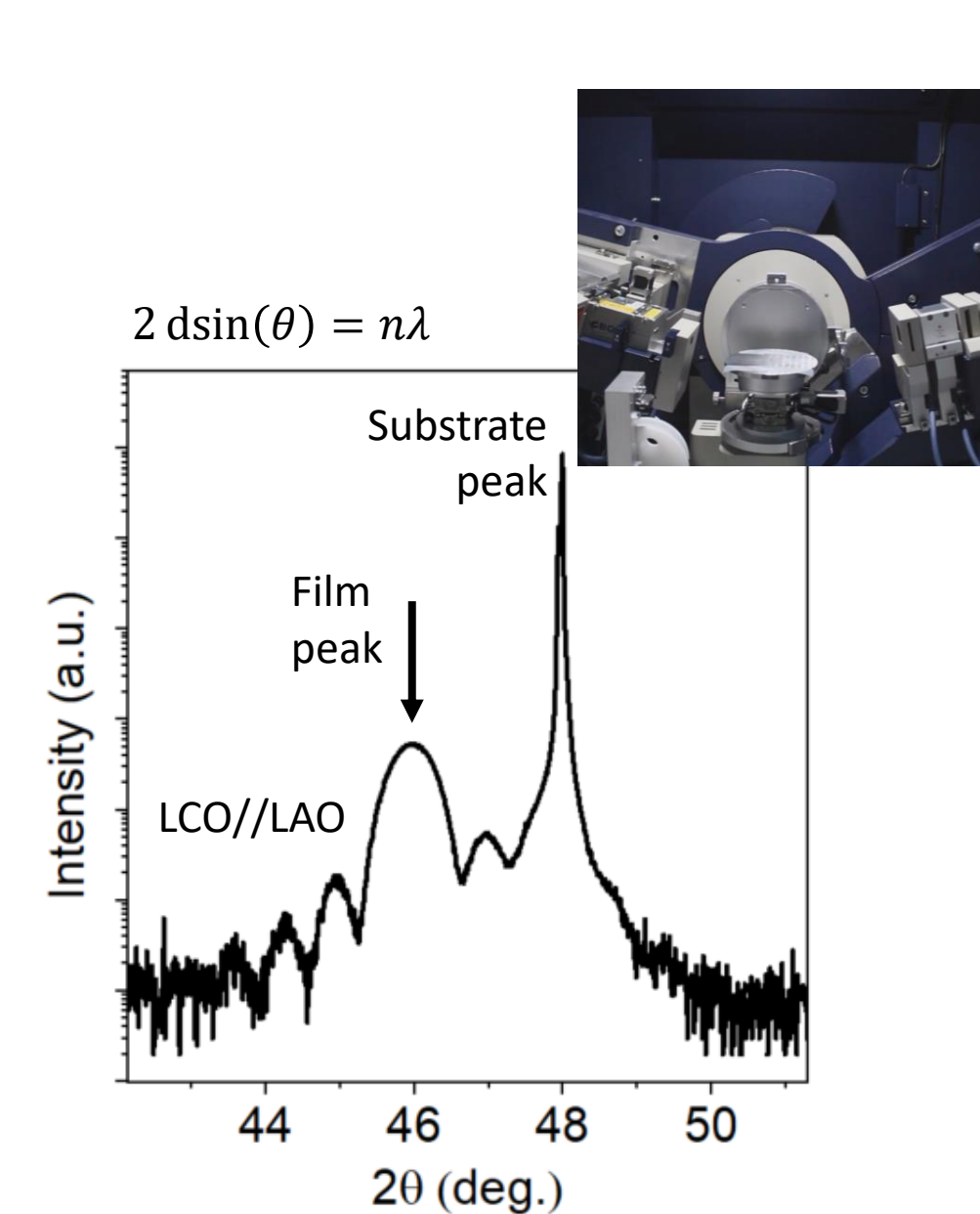
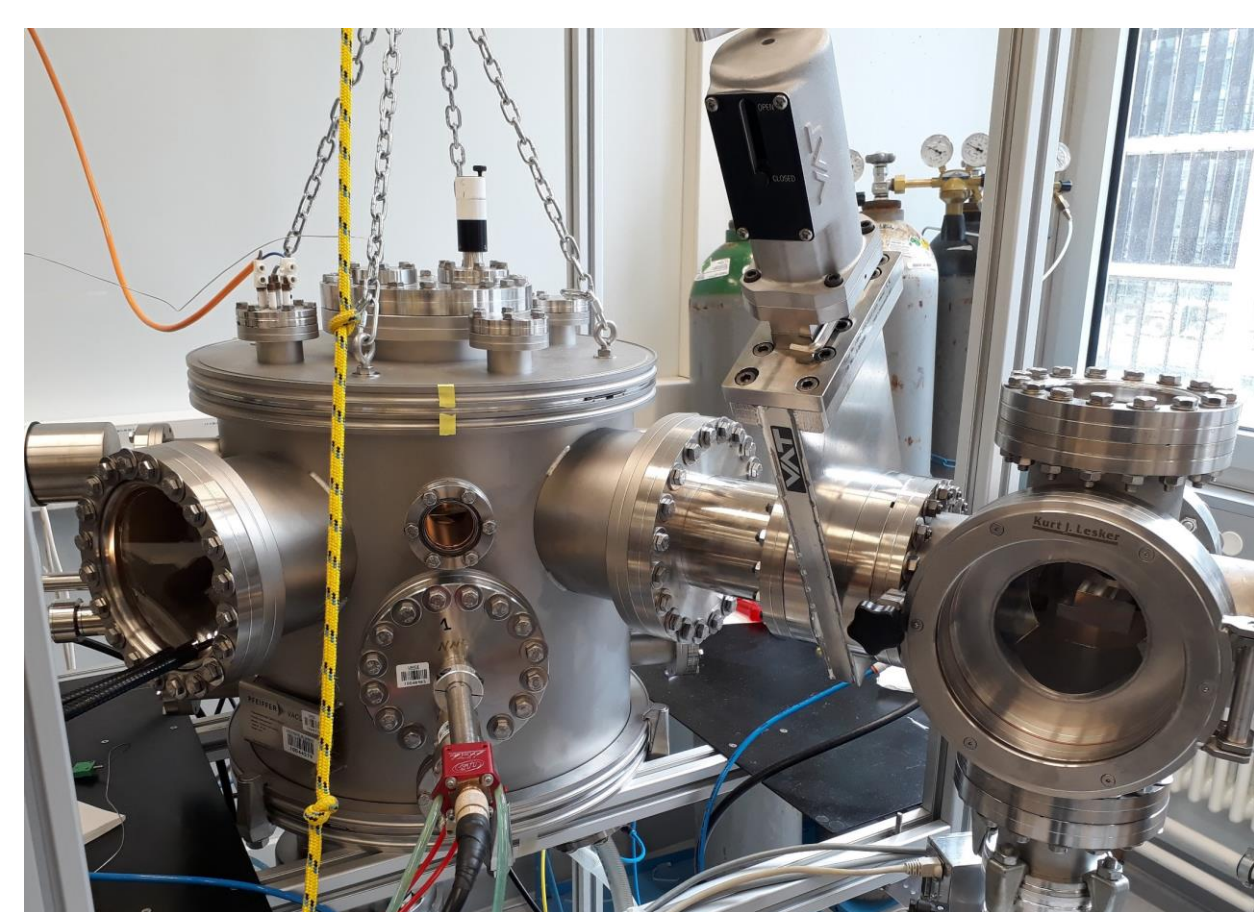
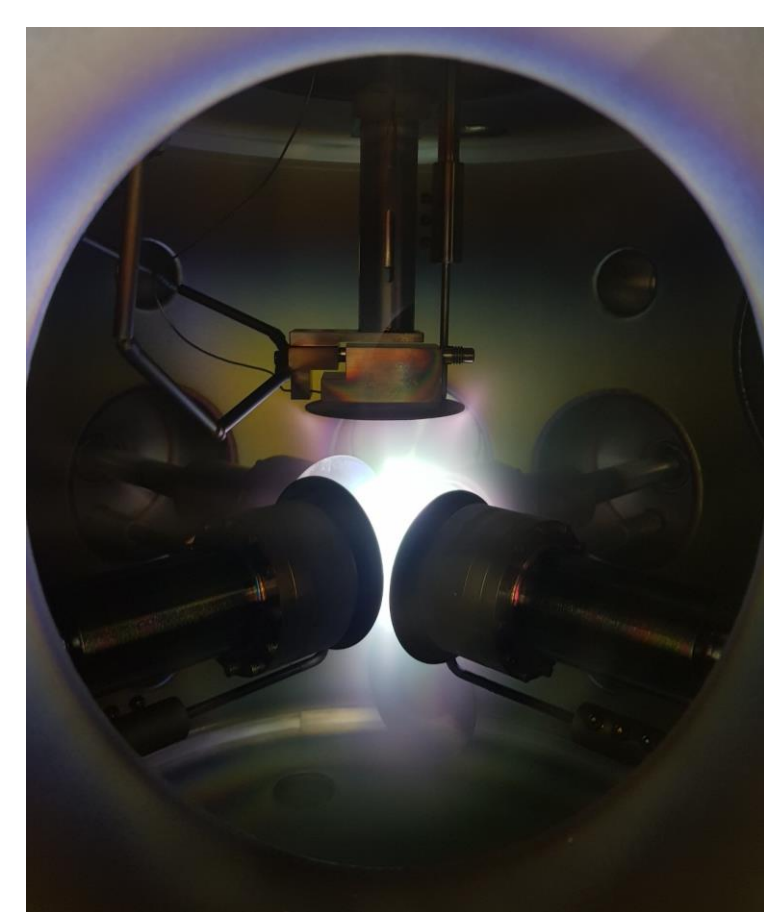
Perovskite oxides have a large spectrum of properties emerging from strong electronic correlations.



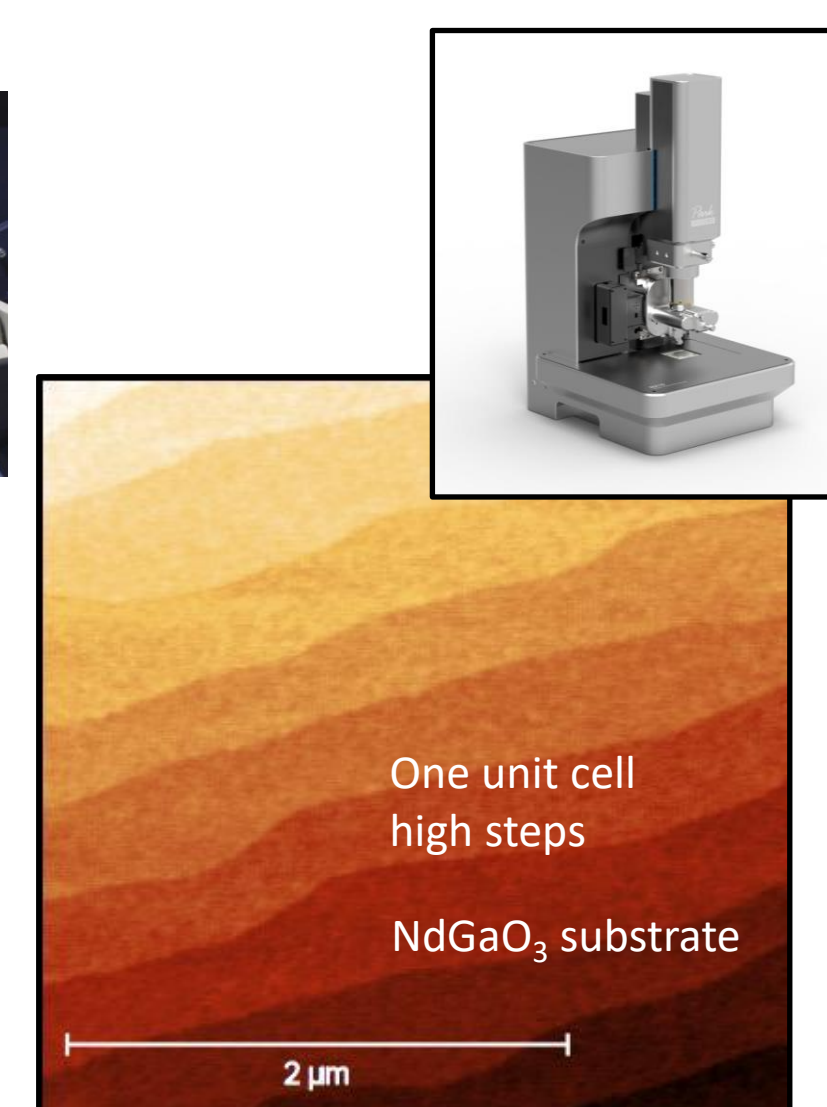
Stacking oxide layers in the form of thin films or superlattices allows us to tune their functionalities and even generate new properties, opening the way to novel applications.



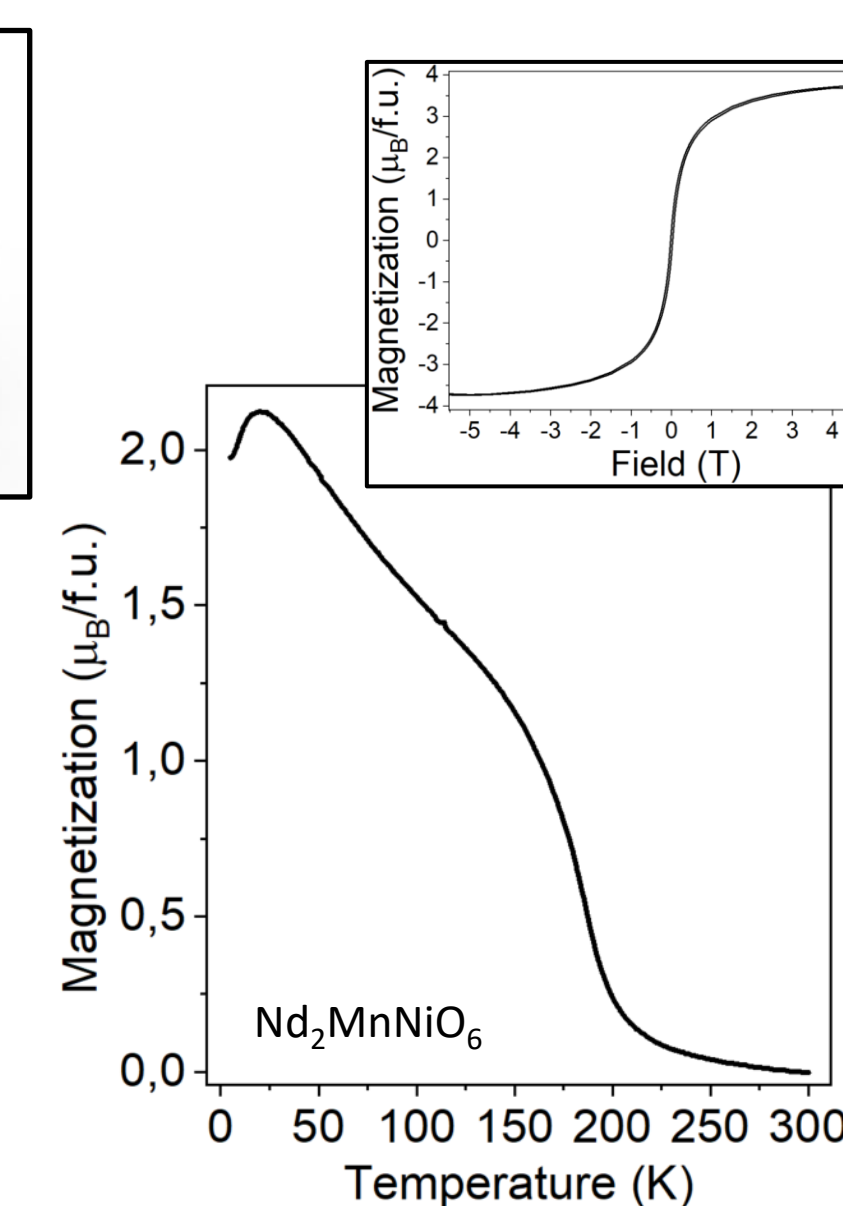
Methods: From Growth to Characterization



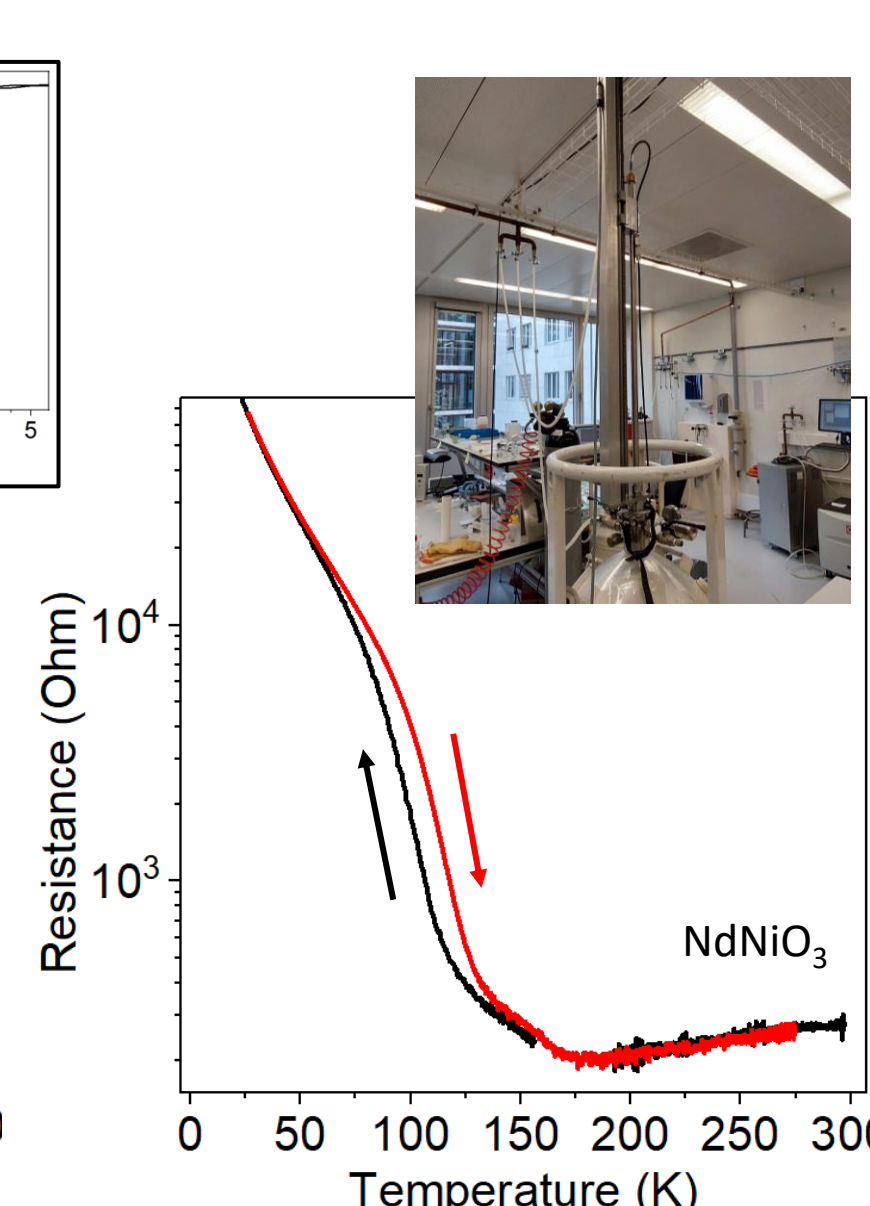
X-ray diffraction (XRD)
Study of the structural quality and lattice parameter



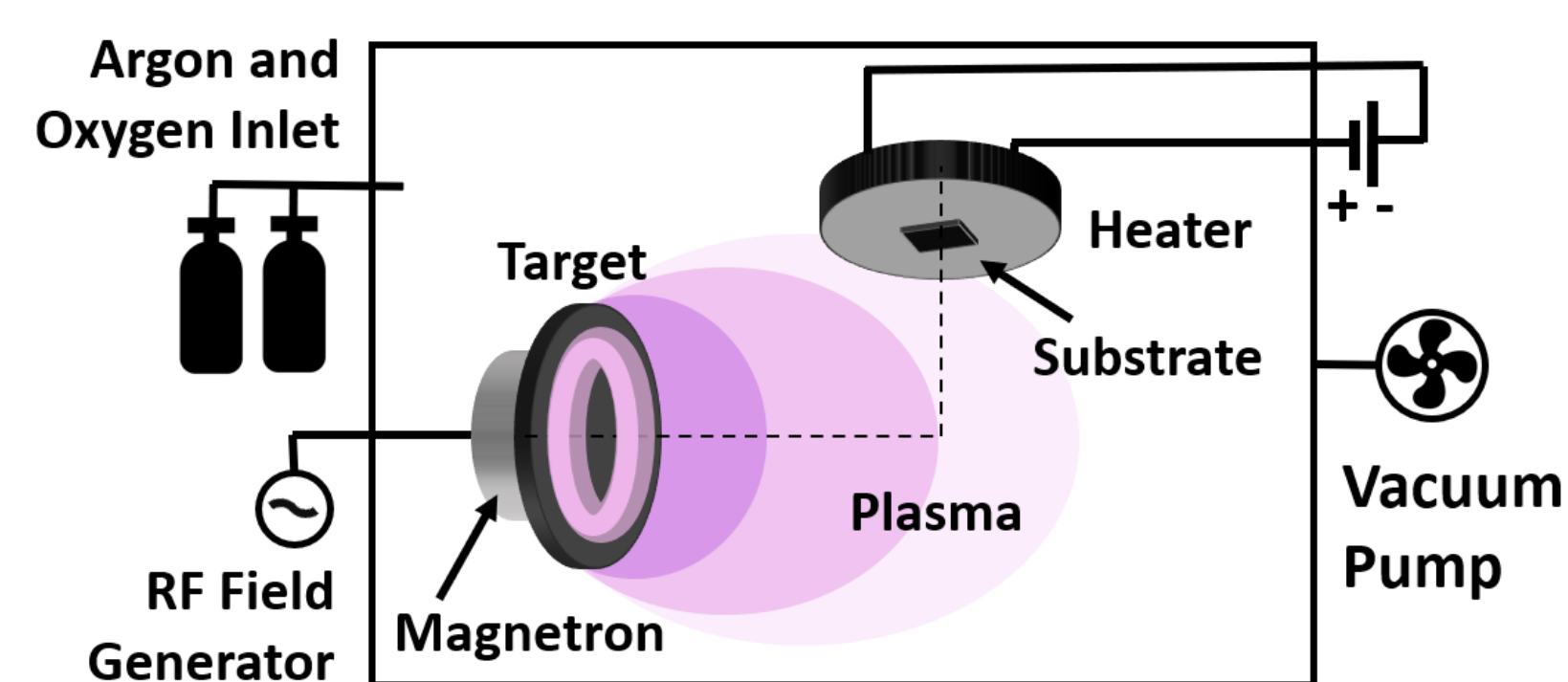
Atomic Force Microscopy (AFM)
Probe of the surface quality



Magnetometry (SQUID)
Measurement of the magnetic response



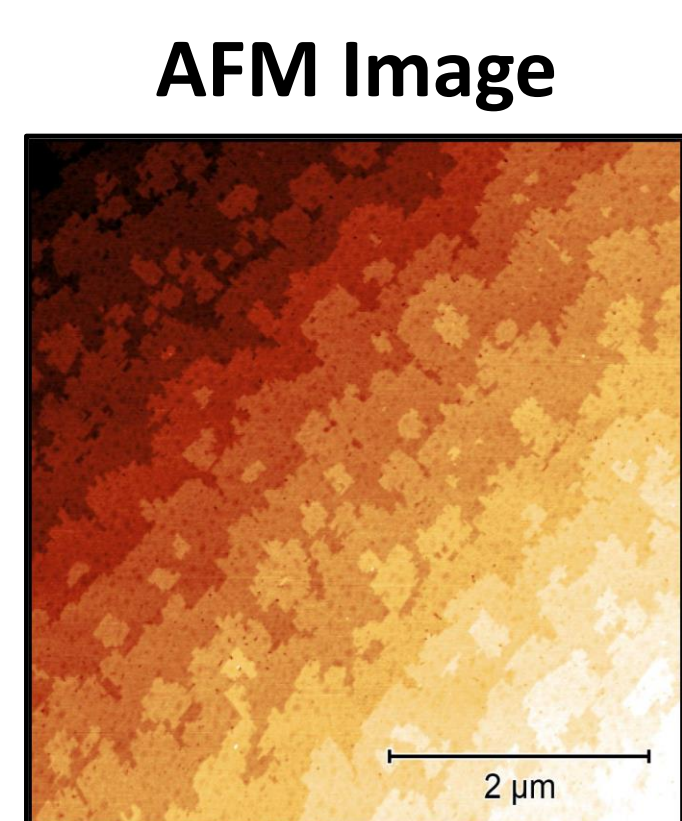
Transport
Quick RT: A fast and easy way to measure the resistivity as a function of temperature (self-made)



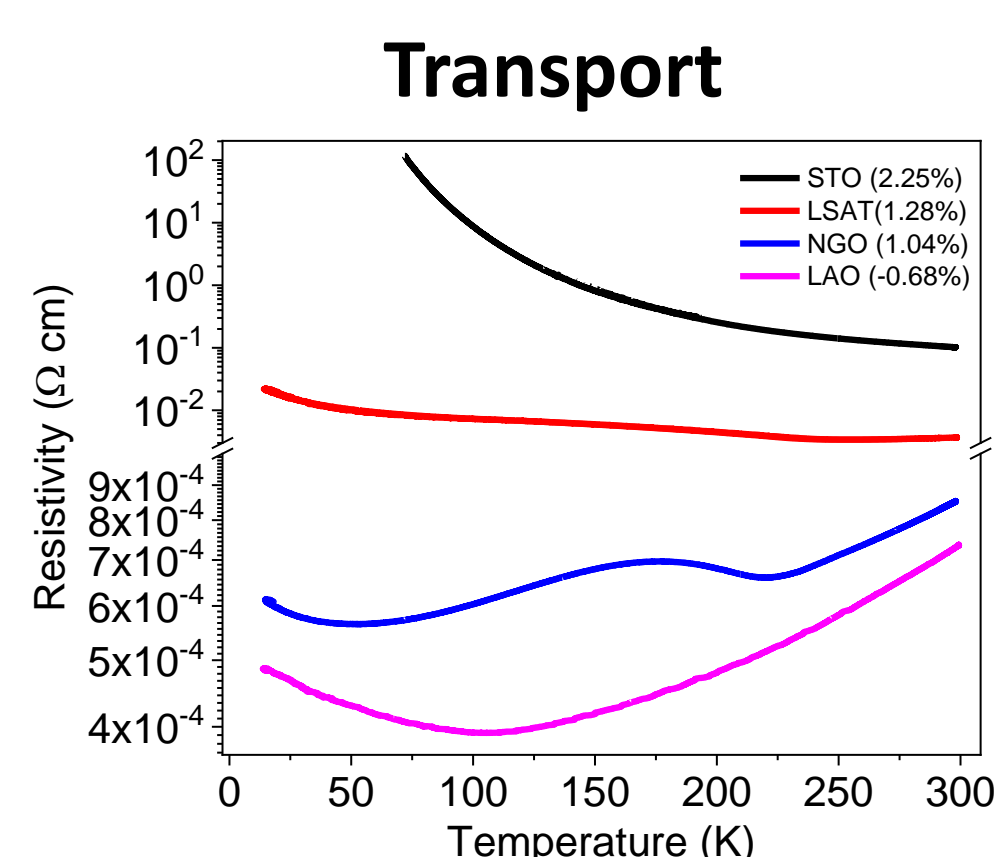
Off-axis RF magnetron sputtering

Our Current Project: Chrome-Based Oxide Heterostructures

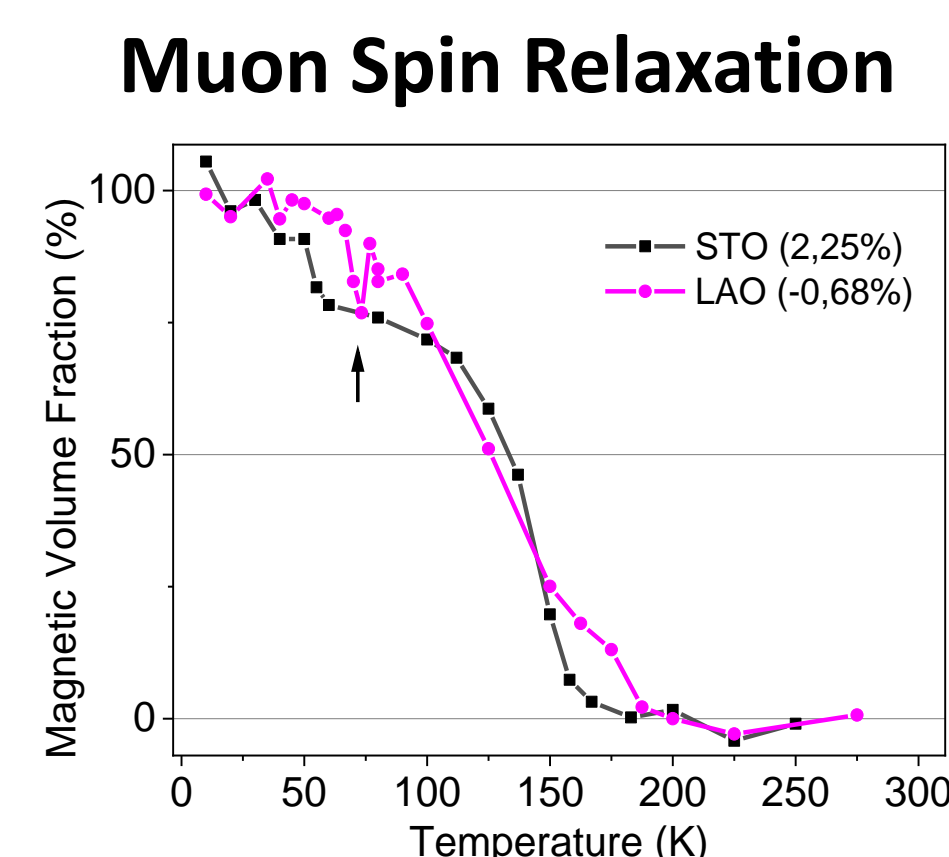
SrCrO₃ (SCO): Its bulk physical properties are still debated. It is suggested to be an antiferromagnetic metal.



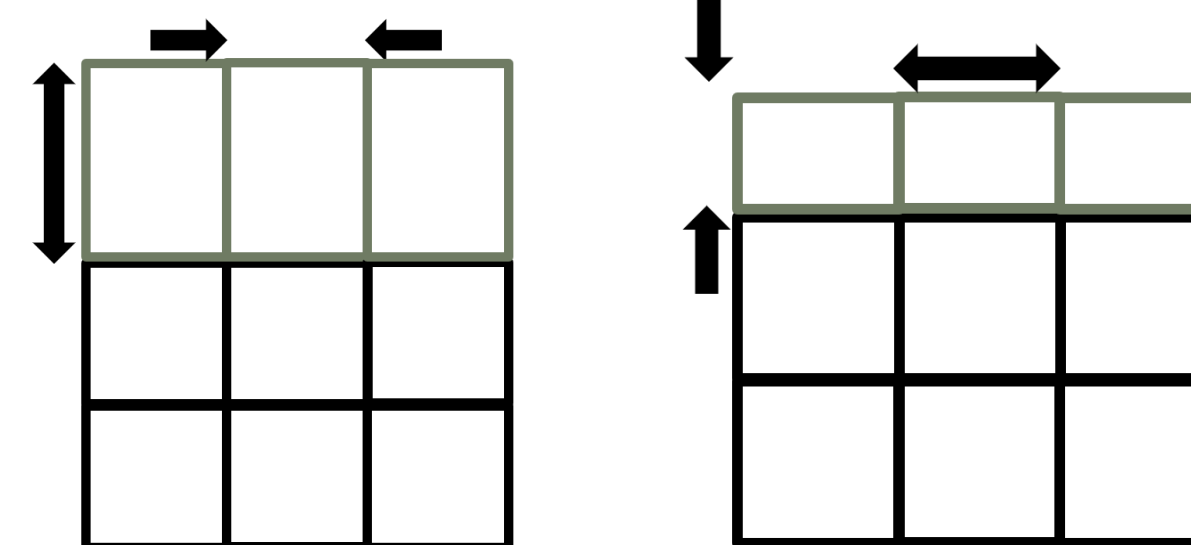
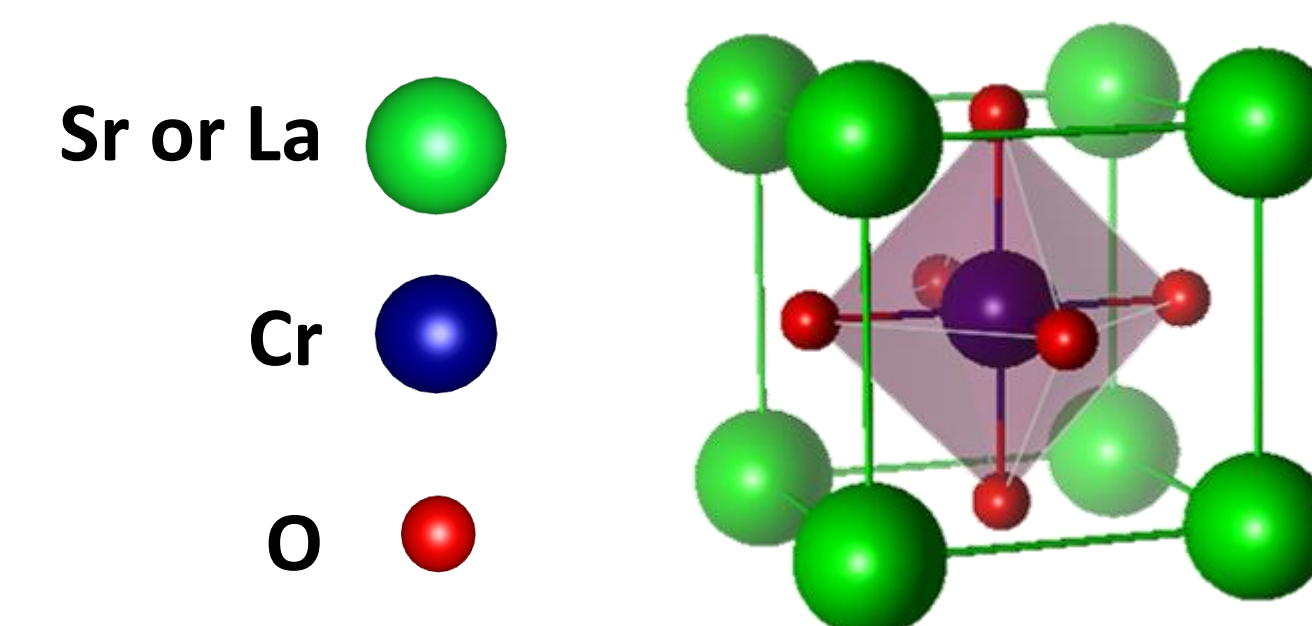
AFM images and XRD (not shown) indicate a perfect crystalline quality.



SCO shows a metal-to-insulator transition upon application of strain.

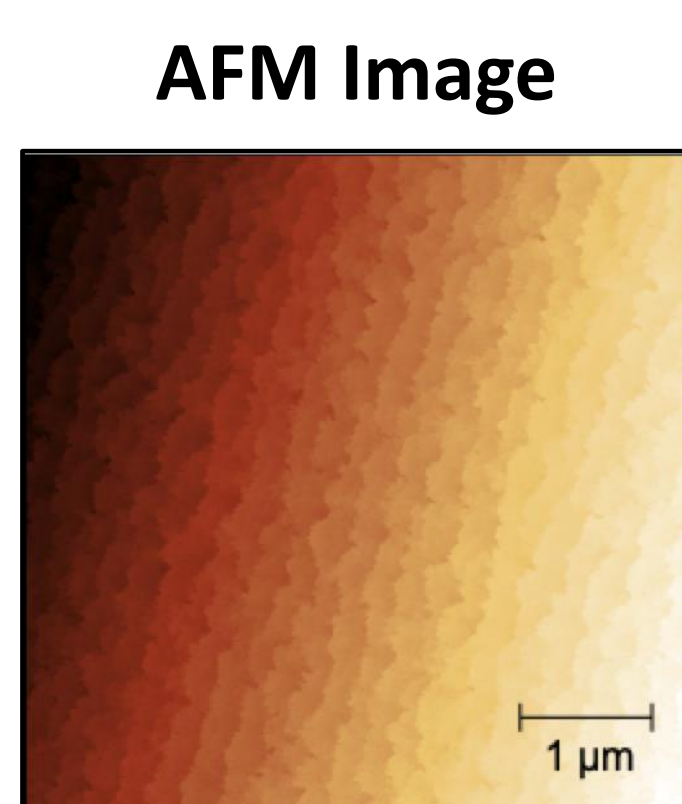


A magnetic transition is observed at about 130K.

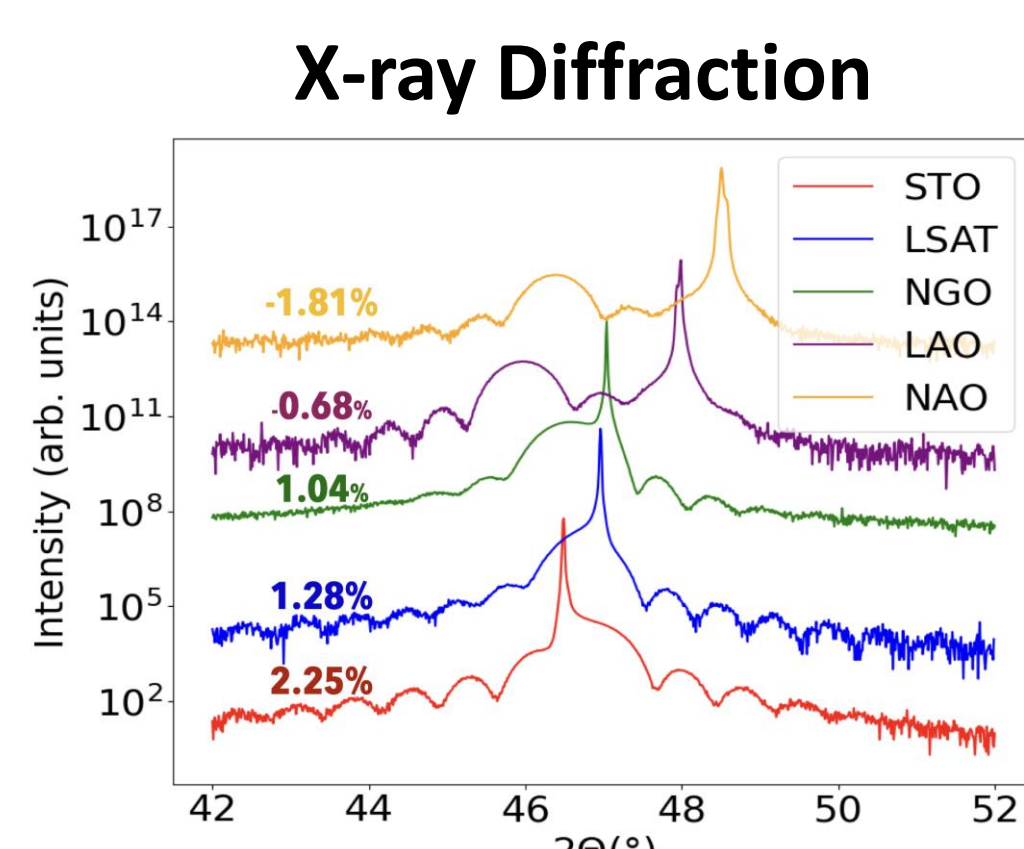


Compressive $a_{\text{Substrate}} < a_{\text{Film}}$ **Tensile** $a_{\text{Substrate}} > a_{\text{Film}}$

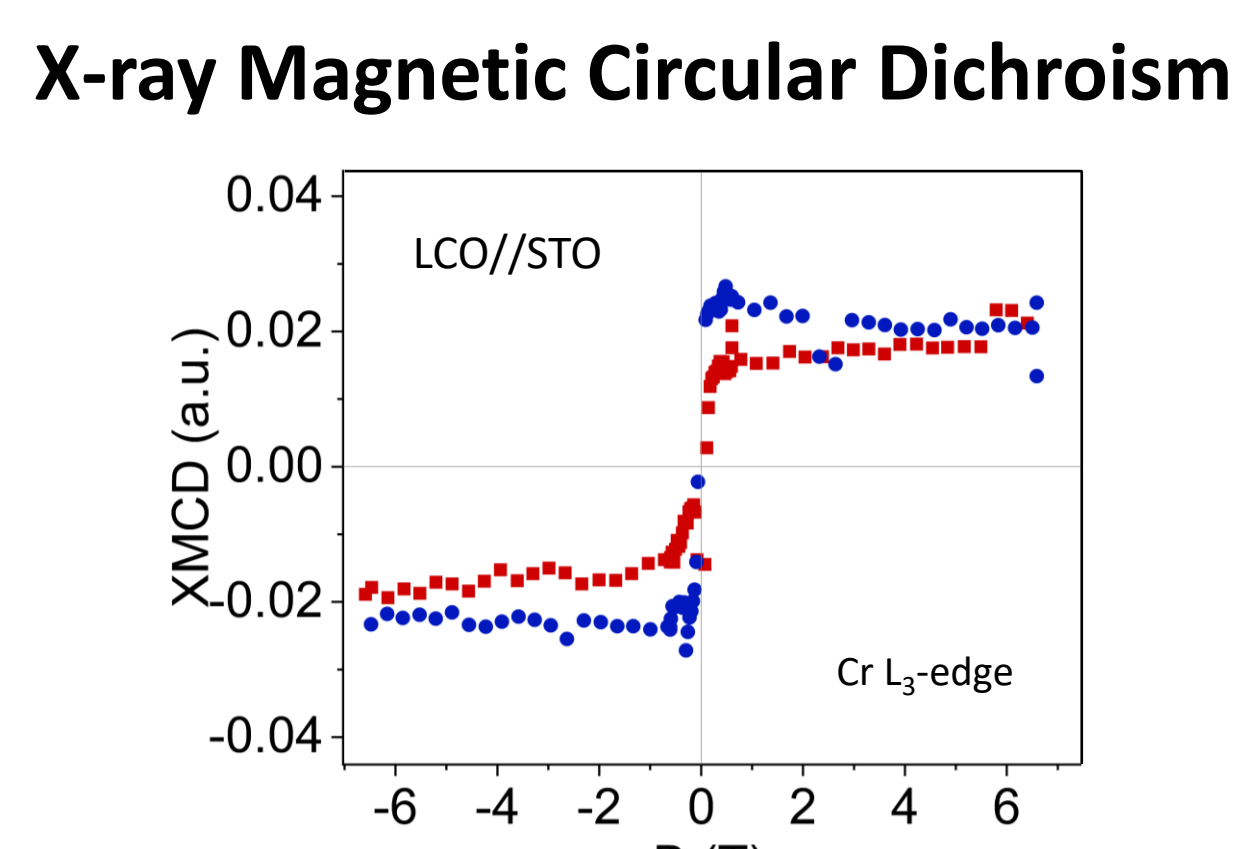
LaCrO₃ (LCO): This insulating compound is a canted G-type antiferromagnet.



LCO topography shows atomically flat terraces separated by unit cell steps.



A strong Bragg reflection and clear Laue fringes in XRD indicate an excellent crystalline quality.



Due to spin canting, LCO shows weak ferromagnetic behaviour.

Epitaxial strain is controlled by choosing a substrate with a smaller (compressive) or larger (tensile) lattice parameter

Outlook:

- Growth and characterization of SCO/LCO superlattices.
- Study of the magnetic and transport properties as a function of strain, thickness and composition.

If you are interested, don't hesitate to ask for a lab-tour!