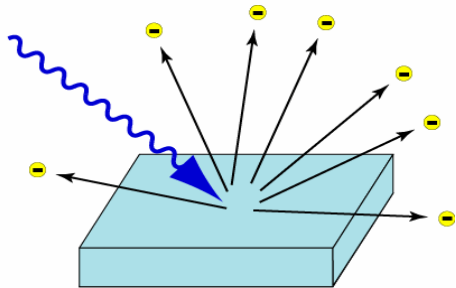


ARPES ON COMPLEX SYSTEMS



Angle Resolved PhotoElectron Spectroscopy

FIRST EVIDENCE FOR THE QUANTIZATION OF LIGHT!

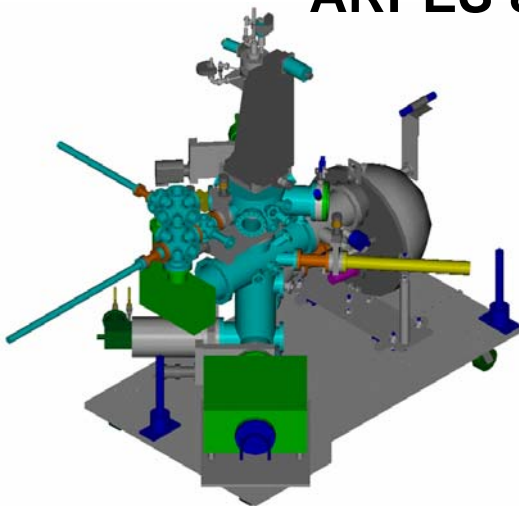
Velocity and direction of the electrons in the solid

Low-energy Electronic Structure → Macroscopic Physical Properties

Superconductivity, Magnetism, Density Waves,

ARPES & EELS

@ UBC



STANFORD SYNCHROTRON RADIATION LABORATORY



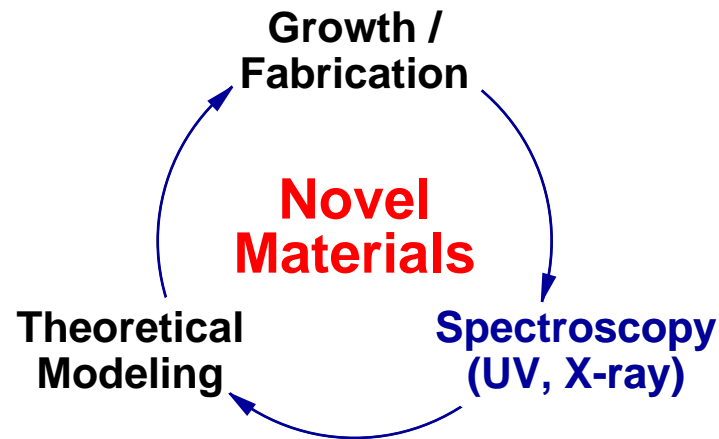
Canadian Light Source Inc.

Synchrotron based spectroscopies





Comprehensive Material Science Program Across Canada



1. Orbital excitations in orbital-ordered ferromagnets

Materials: Eisaki (AIST), Gaulin (McMaster); Spectroscopy: Damascelli (UBC); Modeling: Sawatzky (UBC).

2. Magnetic fluctuations and p-wave superconductivity in $\text{Ca}_{2-x}\text{Sr}_x\text{RuO}_4$

Materials: Maeno (Kyoto), Taillefer (Sherbrooke); Spectroscopy: Damascelli (UBC), Dodge (SFU); Modeling: Mazin (NRL).

3. Nanoscale phase separation and chemical disorder in the high-T_c superconductors

Materials: Eisaki (AIST), Bonn, Hardy (UBC); Spectroscopy: Damascelli, Sawatzky (UBC); Modeling: Sawatzky (UBC).

4. Challenging the Mystery of High-T_c Superconductivity: ARPES on $\text{Ti}_2\text{Ba}_2\text{CuO}_{6+d}$

Materials: Bonn, Hardy (UBC); Spectroscopy: Damascelli (UBC); Modeling: Frantz (UBC), Trambly (Sherbrooke).

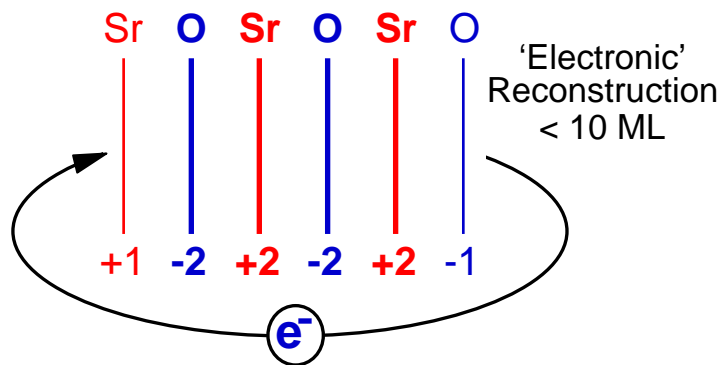
5. TM-Oxide nanostructures: novel magnets, nanowires, and metal-insulator transition

Materials, Spectroscopy, Modeling: Tiedje, Sawatzky, Damascelli (UBC).

5. Novel Nanoscale Phenomena in Transition-Metal Oxides

Ionic Oxide Polar Surfaces

Stabilization of polar surfaces by epitaxy

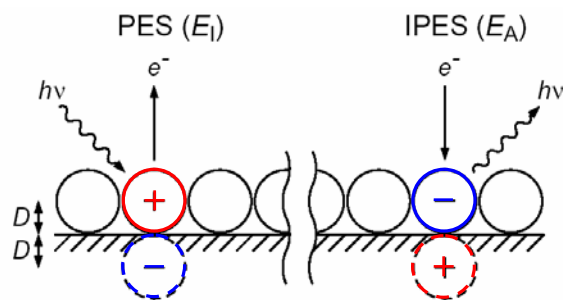


Transparent insulator \rightarrow $\frac{1}{2}$ metallic FM

Applications: Spintronics; CMR

Electronic Structure of Interfaces

Metal-Insulator interface: gap suppression

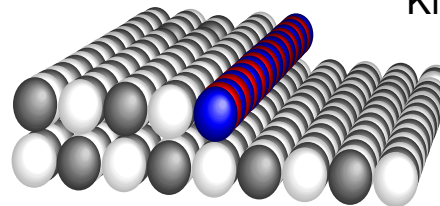


Applications: Molecular Electronics; Fuel Cells; Thermal Barrier Coatings

Ionic Correlated Electron System Surfaces

Tuning the gap via the Madelung potential in ionic insulators

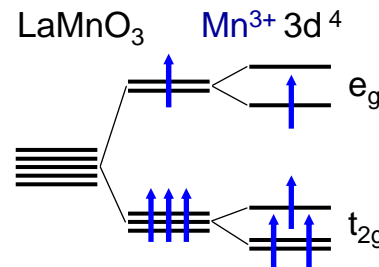
Kinks and steps stabilized by epitaxy



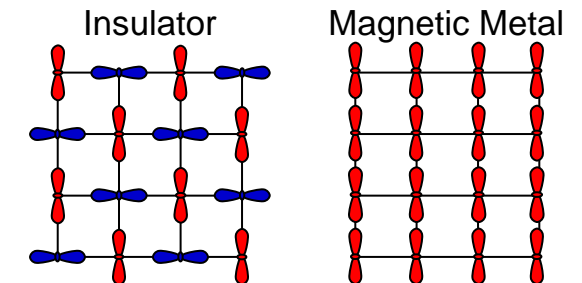
NiO (100) \rightarrow 1D Metallic steps
Superconducting Copper oxides

Applications: Novel SC; QuBits

Strained 2D Layers



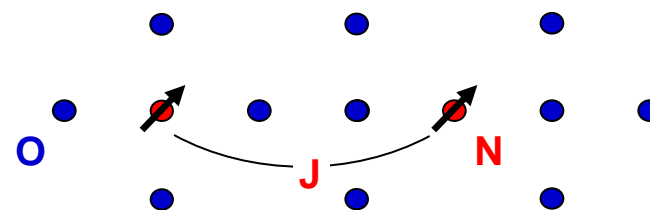
Positive and negative pressure



Applications: CMR; M-I Transition; Orbital Ordering

Artificial Molecules Embedded into a Material

Ca, Mg, Sr, Ni vacancies or O-N substitution in oxides



New class of magnetic materials by "low-T" MBE growth

Applications: Spintronics; Novel Magnets