

Strongly Correlated/Complex Materials Research

Science Themes

- **High-temperature superconductivity**
Cuprates, chalcogenides,
- **Competing orders**
multiferroics, ferroelectrics, colossal magnetoresistance
- **Quantum criticality**
- **Magnetism**
Nanomagnetism, spin dynamics
- **Surfaces and interfaces**
- **Nanoscaled behavior**
Ferroelectrics
- **Topological insulators**

Tools

1) Materials Synthesis

- Oxide MBE
- Single crystals
- PLD
- Oxide nanomaterials

2) Theory and Computation

3) Characterization

- Neutron Scattering
- Electron Spectroscopy
- X-ray Scattering
- X-ray Spectroscopy
- Powder Diffraction
- High field ESR
- Spectroscopic Imaging
- STM
- Electron microscopy
- Bulk properties measurements

Departments involved: CMPMSD, CFN, PSD, SBU-Physics



Planned Facilities for NSLS-II for Hard Condensed Matter

CSX: Soft x-ray coherent scattering:

IXS: Inelastic x-ray scattering, 1 meV resolution:

PWD: Powder diffraction:

SIX: Soft x-ray inelastic scattering, 10 meV resolution:

ESM: μ -angle resolved photoemission, ~ 1meV resolution:

ISR: Resonant elastic scattering:

HIX: Hard x-ray inelastic scattering, 20 meV resolution

SSS: Soft x-ray elastic scattering

MET: Magnetospectroscopy, Ellipsometry

MPP: X-ray scattering

Electronic texture

Lattice excitations

Atomic structure

Spin excitations

Quasiparticle spectrum

Electronic ground states

Electronic excitations

Electronic ground states

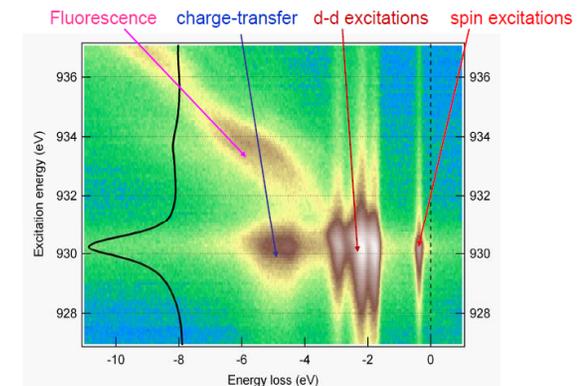
Optical properties

Atomic structure

Black: under construction (project beamlines)

Green: NEXT beamlines (DOE MIE funded)

Red: Approved beamlines (not funded)



What is needed?

Breakout Session:

What else is needed to ensure that the research needs of the strongly correlated community are met and that the NSLS-II facilities can have the greatest impact?

- 1) Additional beamlines? Combined techniques?
- 2) Software infrastructure and data handling needs?
- 3) Additional machine operating modes? Timing signals?
- 4) Detector development?
- 5) Other (non-photon) facilities?
 - Synthesis
 - Nanofabrication
 - Other characterization tools
 - Theoretical support

