

Resonant x-ray coherent diffractive imaging

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Combining resonant methods with polarized x-rays provides sensitivity to magnetic, orbital, and molecular orientation. This dichroism contrast is strongly enhanced at absorption edges due to coupling of the x-ray polarization to electron spin and orbital states. We are developing resonant dichroic x-ray coherent diffractive imaging to study nanoscale domain evolution in magnetic materials and emergent phenomena in correlated materials. In particular, we are exploiting dichroic ptychography to understand how competition between spin and orbital ordering leads to phase separation in complex oxides. These methods, which have a large appetite for coherent flux, will take full advantage of the low-emittance storage rings coming online and are extensible to ultrafast experiments with x-ray lasers.