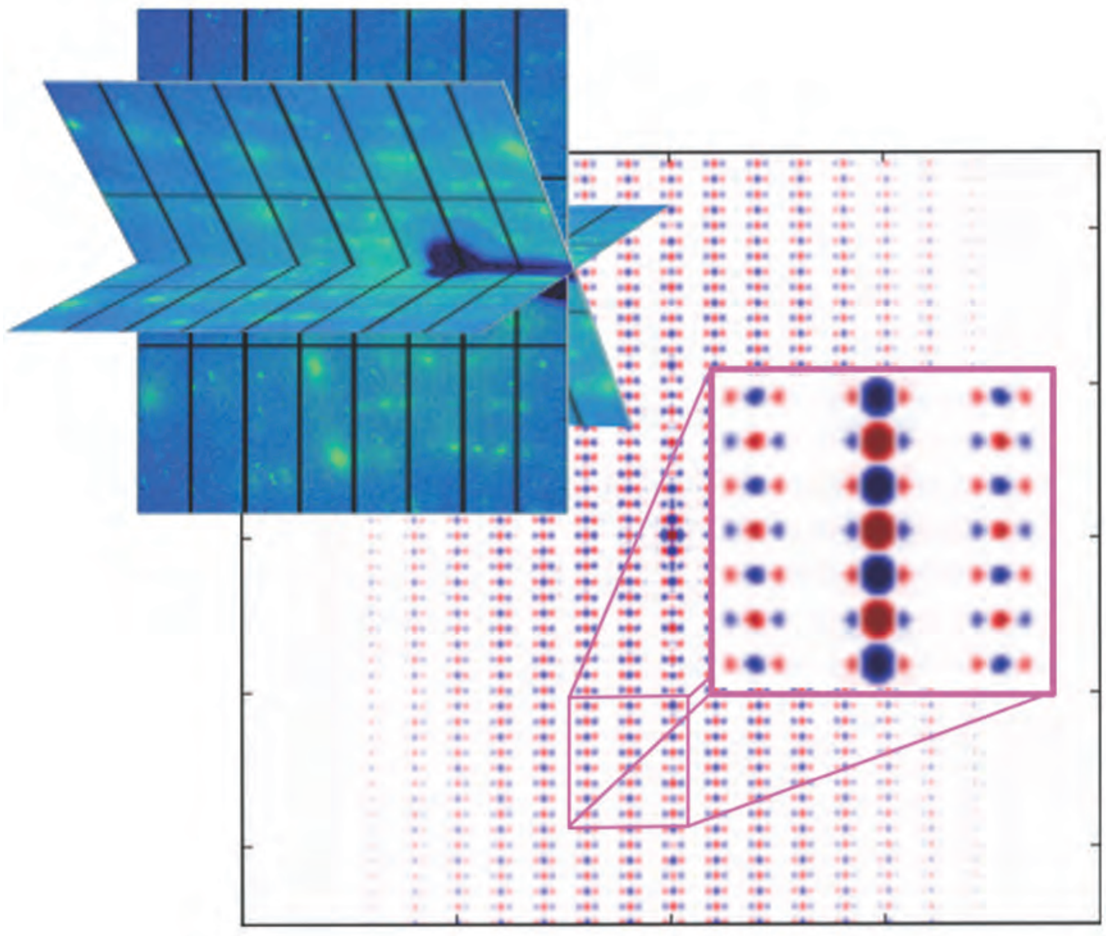
Raymond Osborn

Imaging Nanoscale Disorder in Reciprocal Space

Correlated defects are responsible for the functional properties of many materials that underpin energy-related technologies. Single-crystal diffuse scattering using x-rays or neutrons offers a powerful probe of short-range order in crystalline lattices, but its use has been limited by the experimental challenge of collecting data over a sufficiently large volume of reciprocal space and the theoretical challenge of modeling the results. However, instrumental and computational advances at both x-ray and neutron sources now allow the efficient measurement and rapid transformation of reciprocal space data into three-dimensional pair distribution functions, providing model-independent images of nanoscale disorder in real space. This promises to transform a specialized technique into an essential tool for structural investigations.



Ray Osborn is a Senior Scientist in the Materials Science Division of Argonne National Laboratory, which he joined over 20 years ago following post-doctoral research at the University of Oxford and a staff appointment at the Rutherford Appleton Laboratory. His research is in the field of strongly correlated electron systems probing spin, charge and orbital correlations using neutrons and x-rays. His scientific interests have included quantum critical scaling in actinides, the role of polaron correlations in colossal magnetoresistance, and the competition between magnetism and superconductivity in iron arsenides. His research led to an interest in developing more efficient methods of measuring single crystal diffuse scattering both with neutrons and high-energy x-rays. Ray Osborn is a Fellow of the American Physical Society and the Neutron Scattering Society of America, and was awarded the University of Chicago Distinguished Performance Award in 2006. He is the author of over 180 publications.

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