SEMINAR SERIES

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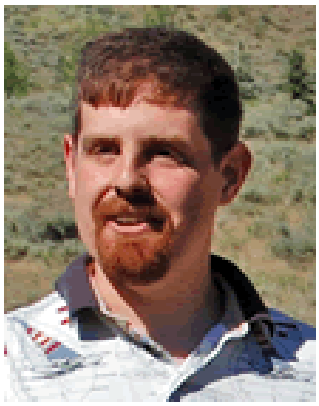
Probing Electrons and Vibrations in Functional Materials



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Developing models to predict the behavior of new inorganic solids and design materials with desirable physical properties relies on accurate determination of structure, including the orbital, spin, and charge character of the active electrons.
In most real materials, properties are driven by local interactions; however, structural information has typically been constrained to average details from diffraction experiments, or direct imaging of individual atoms/molecules but with the loss of detailed knowledge of the dynamics. Recent advancements in total x-ray and neutron scattering have enabled robust local structure information using pair distribution function (PDF) techniques, which, with appropriate analysis methods, can finally allow us to develop a fundamental understanding of the origin of useful electronic phenomena. In this talk, I will present our recent work on applying chemical group theory methods to the interpretation of PDF data to extract meaningful information about the dynamics in a variety of functional materials.

Tyrel McQueen is an Associate Professor of Chemistry at John Hopkins University in Baltimore. He received his BS in Chemistry from Harvey Mudd College in 2004, and his MA (2006) in Chemistry and his PhD (2009) in Chemistry and Materials from Princeton University. His research group is interested in solid state chemistry materials design and synthesis techniques; experimental condensed matter physics, quantum magnetism, and heat- and light-induced charge separation through strong electron correlations; superconductivity.