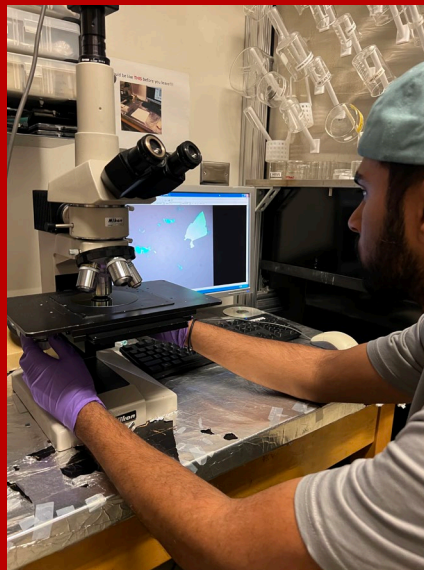


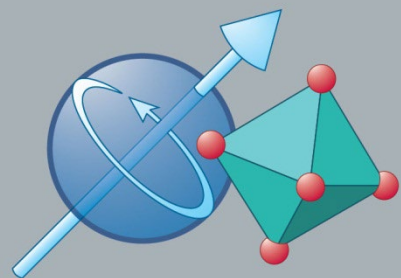
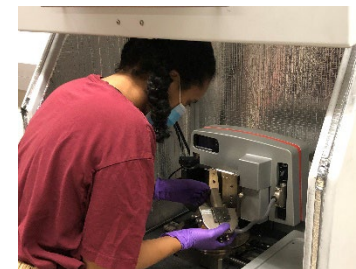
*"A huge strength of the CEM is the people involved. People [faculty, staff, and students and post-docs] are friendly, collaborative, goal-oriented, and true to scientific ideals [honest and truth-seeking]."*

*"One of CEM's greatest strengths is in the large number of opportunities for collaborative research, both locally at OSU and nationally/internationally."*

--Quotes from CEM students



The Center for Emergent Materials at The Ohio State University is a Materials Research Science and Engineering Center (MRSEC) funded by the National Science Foundation (NSF), one of 19 nationwide. The MRSEC program funds teams of researchers from diverse disciplines to work collaboratively on materials research in order to address fundamental problems in science and engineering. By working in teams, called Interdisciplinary Research Groups (IRG), the researchers at CEM tackle scientific problems that are too large and complex for a scientist working alone to solve.



cem

Center for Emergent Materials  
an NSF MRSEC

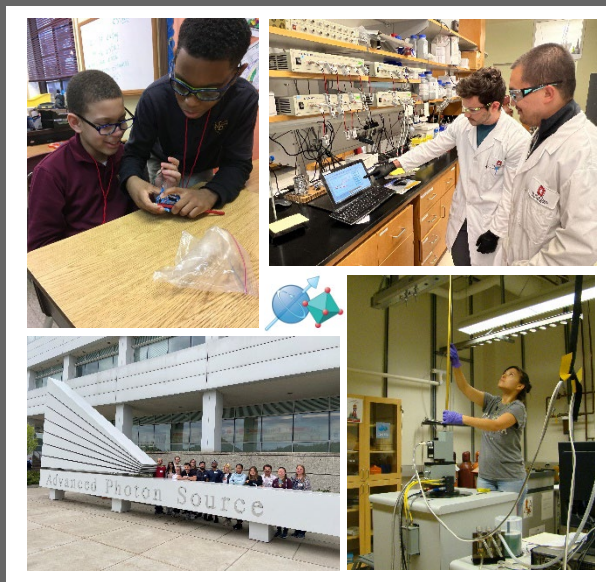
Center for Emergent Materials

2000 Physics Research Building  
191 West Woodruff Avenue  
Columbus, OH 43210-1117

P. Chris Hammel, Director  
hammel.7@osu.edu  
(614) 688-8224

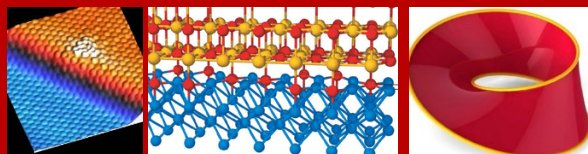
<http://cem.osu.edu>





**“The CEM has become an epicenter for excellence in materials research at OSU.”**

-MRSEC Site Visit Report, 2018



### Research

- **IRG-1: Creation and Control of Metal/Magnetic-Insulator Interfaces**, focuses on magnetic interactions at interfaces between metals and magnets. This team creates novel materials that enable control of atoms at the interface between metals and magnets, determines the structure of the interface using high resolution microscopy, and investigates magnetic configurations and excitations using a variety of transport, magnetic and fast optical probes. The goal is to utilize magnetic structures founded on insulating magnets as platforms for realizing innovative means of controlling static and dynamic behavior of spins.
- **IRG-2: Topology and Fractionalization in Magnetic Materials** focuses on control of configurations and interrelationships between magnetic interactions that protect magnetic states against omnipresent disruptive forces; in particular it seeks to discover materials harboring topologically protected magnetic excitations. This IRG seeks to establish a new paradigm for topological phases in strongly correlated magnetic materials thus providing the precise control over the magnetic properties of solids that will have critical applications for both spintronics and quantum information.

### Outreach & Professional Development

- **Local primary and secondary school partnerships** to enhance STEM learning and DEI through hands on science in programs like Breakfast of Science Champions and Scientific Thinkers.
- **Undergraduates** from local community colleges and universities nationwide conduct cutting-edge research at OSU.
- **Graduate students and postdocs** participate in technical and professional workshops for career development within CEM and across other MRSECs.
- **Physics Masters-to-PhD Bridge program**, which CEM was vital in establishing, strives to prepare talented applicants to succeed in graduate study and enhance the diversity of the Physics PhD program.
- **Education research** to improve retention in undergraduate physics.

### Industry & Collaborations

- **Robust national and international collaborations** including Max Planck Institute in Germany, Tohoku University, UT San Antonio, and Cornell.
- **Industrial and commercial collaborations** with companies such as Intel and Thermo Fisher Scientific improve both partners' ability to translate technologies from the lab to the commercial sector and enhance careers.
- **PREM, Partnership for Research and Education in Materials, with Cal State Long Beach**, investigating topological aspects of magnetism, quantum materials for QIS in reduced dimensions, and biomolecule topology and properties.