Department of Physics Colloquium

Speaker: Dr. Robert A. Makin

Department of Computer Science
Western Michigan University

"Quantifying the Effects of Structural Disorder on the Electronic Properties of Semiconductors"

Open to the public, free of charge

Monday, October 23, 2023 - 4 p.m. – 1110 Rood Hall

Refreshments: 3:30-3:50 p.m., Bradley Commons, 2202 Everett Tower

Abstract: In the context of epitaxial semiconductor layers prepared for electronic devices, disorder is frequently an important consideration. One well-known model for quantifying disorder was developed by Bragg and Williams in the early 1930s, who were concerned with accurately describing the varying degrees of atomic ordering in metal alloys. In their formulation, a numerical order parameter (S) is defined as having a value between 0 (fully randomized lattice) and unity (fully ordered lattice). Traditionally this order parameter is measured using x-ray diffraction techniques, but recently our group has demonstrated that electron diffraction, Raman spectroscopy and electron microscopy are equally viable experimental methods for measuring S. Further building on this framework, it is possible to employ spin-based modeling in conjunction with cluster expansion theory to show that material properties, that are dominated by pair-wise interactions, exhibit a linear dependence on S^2, provided that composition is properly accounted for. Our group is currently using these methods and frameworks to quantify the impact of disorder on the electronic properties of nitride semiconductors that we grow via plasma-assisted molecular beam epitaxy.

Parking: Metered parking is available in Parking Structure #2, near Miller Auditorium.
More information: (269) 387-4941 Department of Physics email Campus map

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