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NEBRASKA CENTER FOR MATERIALS AND NANOSCIENCE
2014 SEMINAR SERIES PRESENTS

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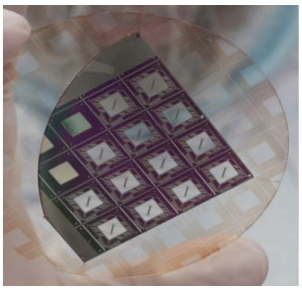
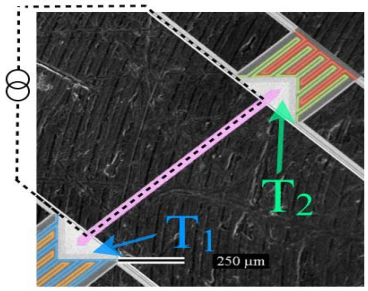
Dr. Barry Zink

Associate Professor, Department of Physics & Astronomy
University of Denver

Spincaloritronics with suspended thermal platforms: Nernst and Hall effects, Magnon Drag, Wiedemann-Franz "violations" and other stories





Interest in spincaloritronics, the interaction of heat, charge, and spin currents in ferromagnetic (FM) systems, continues to grow. This is driven by potential applications not only in spin current generation for future spintronic circuits, but possible energy-harvesting devices that could use transport in the spin channel to overcome the coupling of thermal and electrical conductivity that has long confounded the search for more efficient thermoelectric materials. However, potential optimization of these effects and eventual applications of spincaloritronic devices is possible only if the fundamental interactions are understood. Furthermore, the effect of materials and interface structure on the resulting spincaloritronic properties must be determined. Prof. Zink's research focuses on advancing this understanding, with a particular emphasis on accurate control and measurement of thermal gradients on the thin films or nanostructures often of greatest interest. Reliable measurements of thermally-driven effects in such samples with tiny thermal mass often require great care. In this talk Prof. Zink will present recent measurements of heat flow and Peltier, Seebeck, and Nernst effects in FM thin films, made using unique micromachined thermal isolation platforms. These allow "zero substrate" heating of thin films, which eliminates unintended thermal gradients that can often complicate probes of the fundamental physics and materials properties. He will clarify the role that the anomalous Nernst Effect and transverse thermopowers, such as the planar Nernst effect, plays in the search for thermal spin currents in FM metals. He will also describe careful examination of the Wiedemann-Franz relation between heat and charge flow in FM metals and other thin films, which often show deviations from expected behavior that are important for understanding thermal effects in spintronic systems. Finally, he will briefly discuss new studies of thermal effects on charge and spin transport in non-local spin valves.

Since 2006, Prof. Barry L. Zink has led a research group at the University of Denver focusing on measurements of thermal and thermoelectric properties of thin films and nanostructures. Barry completed his PhD at UC San Diego in 2002, and has earned honors including the NRC Postdoc and the NSF CAREER award.

Wednesday, November 19, 4:00 pm
Room 136 Jorgensen Hall

3:45 pm—Refreshments served in Jorgensen Atrium area

Host:
Prof. Alexey Kovalev
Department of
Physics and Astronomy

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