KIMBERLY A. MODIC

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EDUCATION

Doctor of Philosophy: Physics **2009-2015**
University of Texas, Austin, TX

Bachelor of Science (Cum Laude): Physics **2005-2009**
Clemson University, Clemson, SC
Emphasis in Mathematical Sciences

EXPERIENCE

Postdoctoral Research **2016-2019**
Max Planck Institute, Dresden Germany
- Developed resonant torsion magnetometry — a new technique to study magnetic anisotropy. This advances conventional torque magnetometry with improved sensitivity and reduced systematic errors.
- Gained expertise using the focused ion beam (FIB) to specially design micron-scale samples to suit specific experimental requirements.
- Pulsed- and DC-field resonant torsion magnetometry in quantum spin liquids and topological Weyl semi-metals.
- Pulsed field transport on FIB-prepared heavy Fermion superconductors.
- Interviewed as finalist in the Minerva Fellowship Program.

Graduate Research **2012-2016**
National High Magnetic Field Laboratory, Los Alamos NM
- Pulsed-field transport and thermodynamic measurements on topological semi-metals and other correlated electron systems.
- Measurement probe development and construction with special attention placed on electrical noise optimization in pulsed magnetic fields - most notably the rotator probe designed for the 7 mm bore of the 100 Tesla magnet.
- Transmission spectroscopy on graphite in the destructive single-turn 300 Tesla magnet, including specialized low-temperature cryostat design and construction and technique development using GHz-frequency oscillator coils.
- Resonant cavity techniques (electron paramagnetic resonance) in DC magnetic fields on molecular magnets.

Graduate Teaching **2009-2012**
University of Texas, Austin TX
- Designed and taught the lab courses: classical mechanics, experimental uncertainties in physics.

Undergraduate/Graduate Research **2008-2011**
Materials, Science and Technology Division, Los Alamos NM
- Synthesis, metallurgy and crystallography of shape-memory alloys.

Undergraduate Research **2007-2009**
Clemson University, Clemson SC
- Synthesis of thermoelectric materials, including work with hazardous materials.

SKILLS & TRAINING

Experimental Techniques
- Torque magnetometry measurements of phase transitions and de Haas-van Alphen oscillations in pulsed magnetic fields.
- MHz-frequency contactless conductivity measurements using a proximity detector oscillator to measure changes in skin and penetration depths in pulsed magnetic fields.
- GHz-frequency magneto-spectroscopy in DC magnetic fields.
- Electrical transport measurements of phase transitions and Shubnikov de Haas oscillations in pulsed magnetic fields.
- Imaging with a scanning electron microscope and FIB sample micro-structuring.
- Many compatible techniques of the Quantum Design Physical Property Measurement System, including measurements of specific heat, thermal expansion/striction, magnetization.

Laboratory
- Pulsed and DC field probe design and construction.
- Clean room experience.
- Materials synthesis including arc-melting, flux growth, and Bridgman growth techniques.
- Sample preparation and characterization.

Training
- Q-level cleared Department of Energy (DOE) Worker.
- DOE Radiation Worker.
- Extensive DOE and LANL Safety Training, including gas cylinder safety, cryogenic safety, electrical safety, and national information security.
- Proficient with Mathematica, Origin, Igor, Labview, Latex.

MEDIA & RESEARCH HIGHLIGHTS

"Resonant torsion magnetometry in anisotropic quantum materials" - Nanosensors Blog Post
https://www.nanosensors.com/blog/

"Meet the Users" at the NHMFL in Tallahassee, FL
https://nationalmaglab.org/about/around-the-lab/meet-the-users/kim-modic

MagLab Reports - 2014 Highlights Issue
Focused Ion Beam Lithography for Torque Magnetometry Measurements

MagLab Reports - 2014 Highlights Issue
High Field Magnetic Properties of Li_2IrO_3

TALKS

Scale-invariance in quantum spin systems
Colloquium, University of Cologne, 2019

Scale-invariant magnetic anisotropy in $RuCl_3$
SPICE workshop, University of Mainz, 2019

Resonant torsion magnetometry in anisotropic quantum materials
APS March Meeting, Boston MA, 2019

Resonant magnetic torsion in the high field correlated state of $RuCl_3$
ICM/SCES Conference, San Francisco CA, 2018

Resonant magnetic torsion in the high field correlated state of $RuCl_3$
Cornell University, Ithaca NY, 2018

Resonant torsion magnetometry in anisotropic quantum materials
Max Planck Institute Workshop, Garmisch Germany, 2018

New Tools for Exploring Topological Quantum Matter
Max Planck Institute Workshop, Karpacz Poland, 2016

Three-Dimensional Honeycomb Iridate in High Magnetic Fields
RHMF Conference, Grenoble France, 2015

Three-Dimensional Honeycomb Iridate in High Magnetic Fields
Max Planck Institute, Dresden Germany, 2015

High Magnetic Field Properties of a Honeycomb Iridate
APS March Meeting, San Antonio TX, 2015

Magnetic Anisotropy of a Three-Dimensional Honeycomb Iridate
APS March Meeting, Denver CO, 2014

High Magnetic Field Studies of a Spin ½ Dimer
APS March Meeting, Baltimore MD, 2013

Magnetic Anisotropy of Li_2IrO_3
University of California, Berkeley CA, 2013

Constitution and Magnetism of Iron Superalloys
University of Texas, Austin TX, 2011

OUTREACH & ORGANIZATIONS

- Member of the Worker Safety and Security Team at Los Alamos National Lab.
- Co-founder and Organizer of the “Physics in the Field” Seminar Series.
- Outreach volunteer for science demonstrations/lectures at local elementary schools in New Mexico.
- Member of the Santa Fe Sunrise Toastmasters Club.