

# THUC T. MAI

NRC Fellow - National Institute of Standards and Technology - Email: thuc.mai@nist.gov

## EDUCATION

### Ph.D., Physics

Aug 2014 – May 2019

The Ohio State University | Columbus, OH, USA

### M.S., Physics

Aug 2012 – Aug 2014

The Ohio State University | Columbus, OH, USA

### B.S., Physics

Aug 2007 – May 2011

Syracuse University | Syracuse, NY, USA

Minor: Applied Mathematics

## RESEARCH EXPERIENCE

### Research Assistant

Jan 2014 – April 2019

The Ohio State University (OSU)

Advisor: **Rolando Valdés Aguilar**

- ◆ Ultrafast laser skills:
  - Operated and maintained a high-power ultrafast laser system from *Coherent*, which includes: *Legend Elite*, *Topas*, *Vitara*, *Evolution*
  - Operated and maintained a *Femtolaser Core 20* Ti:Sapphire oscillator
- ◆ Designed, built, maintained, and operated multiple time-domain terahertz (THz) spectrometers, in transmission and reflection geometry
  - THz sources and detectors used: LT-GaAs photoconductive antenna, ZnTe, GaP, GaSe, ambient atmosphere plasma, tri-layer of W/CoFe/Pt
- ◆ Performed THz studies on quantum materials, such as: skyrmion magnet (FeGe), novel multiferroics ( $\text{Sr}_2\text{FeSi}_2\text{O}_7$ ,  $\text{BaFe}_{12}\text{O}_{19}$ ), quantum magnets ( $\text{CaFe}_2\text{O}_4$ ,  $\alpha\text{-RuCl}_3$ ), 5d transition metal oxides ( $\text{Na}_2\text{IrO}_3$ ,  $\text{Sr}_2\text{IrO}_4$ )
- ◆ Design and engineering skills:
  - Designed a mechanical rotating device for THz polarizer, an apparatus that can modulate the THz polarization up to 100 Hz
  - Used *Solidworks*, *Autodesk Inventor* to design mechanical parts
- ◆ Programming, scripting and analysis skills:
  - Wrote *LabVIEW* software for instrument control and data acquisition
  - Used *Mathematica* to simulate the THz polarization measurement
  - Used *Igor Pro* to numerically solve for the optical properties from THz data
  - Used *Mathematica*, *Igor Pro* to fit the materials' properties with known theoretical models
  - Used *Mathematica* to simulate the effects corrective algorithms, such as cubic spline and higher order interpolation, on non-uniform sampling in time-domain terahertz spectroscopy
- ◆ Cryogenic skills:
  - Operated and maintained a *closed-cycle optical cryostat* from *Janis Research Company*
  - Operated and maintained an *Oxford Spectromag*, a liquid helium optical cryostat with a superconducting magnet

### Visiting Scientist

NIST (National Institute of Standards and Technology) Gaithersburg, MD, USA

Sponsor: **Angela Hight-Walker**

- ◆ Performed Raman Spectroscopy measurement on  $\alpha\text{-RuCl}_3$
  - ◆ Carried out multiple Lorentzians fitting procedure on Raman spectra
- Used group theory's tensor analysis to explain fitting results

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## **Undergraduate Student Intern**

Los Alamos National Laboratory

Los Alamos, NM, USA

Supervisor: **Cynthia Reichhardt**

*June 2018*

◆ Modified and run a numerical simulation program in C  
Simulated the movement of bacteria across an asymmetric barrier

## **CONFERENCES & WORKSHOPS**

*Gordon Research Seminar and Conference: Multiferroics*

*Aug 2018*

Bates College, Lewiston, ME, USA

*American Physical Society (APS) March Meeting*

*March 2015, 2016, 2017*

Various locations, USA

*Autumn School on Correlated Electrons: Quantum*

*Sept 2016*

*Materials: Experiments and Theory*

Forschungszentrum Jülich, Germany

*Spin-Orbit Coupling and Magnetism in Correlated Transition  
Metal Oxides Workshop*

*May 2015*

OSU, Columbus, OH, USA

*Institute for Materials Research (IMR) Materials Week*

*May 2014, 2015, 2018*

OSU, Columbus, OH, USA

## **PRESENTATION**

*Gordon Research Seminar and Conference: Multiferroics*

*Aug 2018*

Bates College, Lewiston, ME, USA

Poster presentation: "Terahertz Excitation of Magnon Modes in the Orthorhombic Antiferromagnet  $\text{CaFe}_2\text{O}_4$ "

*IMR Materials Week*

*May 2018*

OSU, Columbus, OH, USA

Poster presentation: "Magnetic excitations in  $\text{CaFe}_2\text{O}_4$ "

*3MT (3 Minute Thesis) Competition:*

*May 2018*

*"Magnets, Light, and Technology"*

OSU, Columbus, OH USA

Finalist

*APS March Meeting 2018*

*March 2018*

Los Angeles, CA, USA

Oral presentation: "Terahertz excitation of magnon modes in  $\text{CaFe}_2\text{O}_4$ "

*APS March Meeting 2017*

*March 2017*

New Orleans, LA, USA

Oral presentation: "Tests of Terahertz Circular Birefringence in  $\text{Sr}_2\text{IrO}_4$  thin films"

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*Autumn School on Correlated Electrons:* Sept 2016  
*Quantum Materials: Experiments and Theory*

Forschungszentrum Jülich, Germany

Poster presentation: "Terahertz excitations of spin-orbital ground state in multiferroic  $\text{Sr}_2\text{FeSi}_2\text{O}_7$ "

*APS March Meeting 2016* March 2016

Baltimore, MD, USA

Oral presentation: "Terahertz excitations of spin-orbital ground state in multiferroic  $\text{Sr}_2\text{FeSi}_2\text{O}_7$ "

*Spin-Orbit Coupling and Magnetism in Correlated Transition Metal Oxides Workshop* May 2015

OSU, Columbus, OH, USA

Poster presentation: "Terahertz Spectroscopy on Multiferroic  $\text{Sr}_2\text{FeSi}_2\text{O}_7$ "

*APS March Meeting 2015* March 2015

San Antonio, TX, USA

Oral presentation: "Terahertz study of potential multiferroic materials  $\text{Sr}_2\text{FeSi}_2\text{O}_7$  and  $\text{BaFe}_{12}\text{O}_{19}$ "

## PUBLICATIONS

*Thuc T. Mai, M. Azhar, E. Barts, L. Zhang, S.-W. Cheong, M. Mostovoy, R. Valdés Aguilar, "Orthorhombic Magnons in  $\text{CaFe}_2\text{O}_4$ "*  
In preparation

*A. M. Potts, T. T. Mai, M. T. Warren, and R. Valdés Aguilar, "Corrective re-gridding techniques for non-uniform sampling in time-domain terahertz spectroscopy," J. Opt. Soc. Am. B 36, 1037-1043 (2019)*

*Thuc T. Mai, C. Svoboda, M.T. Warren, T.-H. Jang, J. Brangham, Y.H. Jeong, S-W. Cheong, R. Valdés Aguilar, "Terahertz Spin-Orbital Excitations in the paramagnetic state of multiferroic  $\text{Sr}_2\text{FeSi}_2\text{O}_7$ ", PHYSICAL REVIEW B 94, 224416 (2016)*

*C.J. Olson Reichhardt, J. Drocco, T. Mai, M.B. Wan, and C. Reichhardt, "Active matter on asymmetric substrates" Conference on Optical Trapping and Micromanipulation, Proc. SPIE 8097, 80970A (2011)*

## TEACHING EXPERIENCE

**Graduate Teaching Assistant**

OSU  
Columbus, OH, USA

Aug 2012 – May 2014  
Jan 2016 – May 2016  
Aug 2016 – May 2017

Instructed students in recitations and laboratory classes  
Conducted exam reviews and tutoring sessions outside of scheduled classes

## MENTORING EXPERIENCE

**Graduate Student Mentor for REU Program**  
(Research Experiences for Undergraduates)

Summer 2016, 2018

**OSU Physics Department's First Year Mentoring**

Aug 2015 – 2017

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## PROGRAMMING SKILLS

### Proficient in:

C, C++, Python  
Certified LabVIEW Associate Developer  
(CLAD)  
Mathematica, Igor Pro, Octave  
Shell Scripts (C, Bash)

## AFFILIATIONS

*Member of OSU's Physics  
Graduate Students Council*      *May 2016 – May 2017*

*Member of the American  
Physical Society (APS)*      *Jan 2015 – Present*

## COMMUNITY SERVICE

*The Ohio Academy of Science – State Science Day*      *May 12, 2018*

*Scientific Thinkers at Innis Elementary School*      *Fall 2015, Fall 2017*  
Instructed/demonstrated scientific principles to 1<sup>st</sup> – 5<sup>th</sup>  
grade students through simple experiments

*Breakfast of Science Champions for Hilltonia Middle School*      *Nov 8, 2017*

*Science Day at Innis Elementary School*      *Dec 2015, 2016, 2017*

*Ohio Science Olympiad 2015*      *April 2015*