MOHAN GIRI

Department of Physics, Baylor University

Waco, Texas, 76706

Email: mohan_giri1@baylor.edu or

mohangiri56@gmail.com

Education

Ph.D.	2026 (Expected)	Physics, Baylor University, Texas, United States.
MA	2025	Physics, Baylor University, Texas, United States.
MSc	2018	Physics, University Campus, Tribhuvan University, Nepal.
BSc	2014	Physics, Chemistry, Mathematics, Trichandra Multiple College, Tribhuvan University, Nepal.

Skills

- **Laboratory-Based**
  Within Condensed Matter Physics, I specialize in Electronic and Optical Properties of Semiconductors, Superconductors, 2DEG, and Oxytellurides. My top skills include:
  - **Semiconductors**:
    - Development and implementation of an experimental framework to investigate carrier dynamics and relaxation mechanisms in semiconductors using infrared pump–terahertz probe spectroscopy
  - **Superconductors**:
    - Construction of THz-Time Domain Spectroscopy system to study the optical properties of superconductors, including frequency and temperature dependent conductivity, refractive index, dielectric constant, and properties such as critical temperature, superconducting gap, penetration depth, etc in superconductors.
  - **2DEG**:
    - Performing cyclotron resonance measurement applying magnetic field at mK temperature to study the electron mobilities in the 2D electron gas, such as GaAs quantum well.
  - **Oxytellurides**:
    - Studying the structural and vibrational properties of oxytellurides (La_2TeO_2, La_2TeO_6, and Pr_2TeO_6) using Raman Spectroscopy.
- **Equipment-Based**
  - Laser Systems: Alignment and operation of Spectra Physics laser amplifier and oscillator

systems (Solstice Ace, Tsunami), and Optical Parametric Amplifier (OPA, TOPAS).

  - Cryogenic Systems:
    * Expertise with Bluefors dilution refrigerators (7mK, 7T)
    * ARS cryostat (4K) and Janis cryostat.
  - Spectrometer, Powermeter, Optical Chopper, Lockin, Delay Stage, PMT, etc.

- **Other Techniques**
  - Basic optical techniques including auto-correlation, frequency resolved optical gating, 2D THz spectroscopy, FTIR, second and third harmonic generation, etc.

- **Computer-Based**
  My top computer skills include:
  - **Ab-initio (DFT) Calculations**:
    * Calculating the electronic and optical properties of materials using QUANTUM ESPRESSO.
  - **Programming and Computational Tools**
    * Python, LabVIEW, Mathematica, MATLAB, FORTRAN, and LaTeX.
  - **Design Tools**
    * 2D design with CAD as well as 3D design with TinkerCad and Fusion 360.
  - **Data Analysis and Visualization**
    * Data analysis using Python libraries including Pandas, NumPy, SciPy, and SymPy and data visualization using libraries such as Seaborn and Matplotlib.
  - **Machine Learning**
    * Linear regression and classification using traditional learning techniques such as Scikit-Learn and neural networks such as Tensorflow and Pytorch.

- **Experimental Design, Instrumentation, and Data Acquisition**
  - Ultrafast Experiments designing, optical alignment, and its implementation.
  - Instrumentation of equipment such as Delay-stage, optical chopper, power meter, thermometer, spectrometer, and lockin, using Python and LabVIEW.
  - Data acquisition and analysis using custom-developed Python software.

- **Professional Skills**
  - Development of research proposals, drafting/review of scientific reports using LaTeX.
  - Good experience in data analysis of ultrafast spectroscopic experiments.
  - Publishing and managing bibliographies (EndNote, Zotero, and Mendeley).

- Delivering research presentations and conducting educational sessions.
- Comprehensive leadership ability, good teamwork, and interpersonal skills.

Manuscripts Under Preparation

- **M. Giri**, C. Bomberger, T. U. Boehm, J. O. Zide, and D. J. Hilton **Carrier Dynamics of ErAs:GaAs$_{1-x}$ Bi$_x$ from localized states using infrared pump, Terahertz probe Spectroscopy**.
- **M. Giri**, C. Bomberger, J. O. Zide, and D. J. Hilton **Fluence Dependent Ultrafast Dynamics of ErAs:GaAs$_{1-x}$ Bi$_x$ using infrared pump, Terahertz probe Spectroscopy**.
- T. Norden, R. J. Vukelich, **M. Giri**, T. G. Hastings, M. M. Caldwell, and D. J. Hilton **Development of a Broadband THz Spectrometer for a Dilution Refrigerator**.
- T. Hastings, R. Camata, D. J. Hilton, R. J. Vukelich, **M. Giri**, T. Norden, N. Palagiri, Z. Nasiri **Terahertz Time-Domain Spectroscopy in FeSe thin films**.
- B. Aryal, **M. Giri**, N. Dangi, D. Nepal, A. Denisenkoe, S. Baral, G. C. Kaphle, and W. Wilcox **System Energies for Pentaquark Family Using Thomas-Fermi Quark Model**.

Peer-Reviewed Publications

1. **M. Giri**, S. Baral, G. C. Kaphle, N. Dangi, S. Shiwakoti, L. Bardomero, P. Lashomb and W. Wilcox "Investigation of quark distributions in a family of pentaquarks using the Thomas–Fermi quark model." *Communications in Theoretical Physics*, vol. 73, no. 3, 2021, p. 035202. doi:10.1088/1572-9494/abdaa4.

Research Projects (Unpublished)

- Cyclotron Resonance experiment to measure electron mobilities in 2DEG (Baylor University).
- THz-Time Domain Spectroscopy experiment to study the optical properties of $GdScO_3$ (Baylor University).
- Terahertz spectroscopy of the Dirac semimetal $SrIrO_3$ (Baylor University).
- Study of Structural and Vibrational Properties of Oxytellurides using Raman Spectroscopy (Baylor University).
- Development of Raman Spectrometer from scratch (Baylor University).
- Thomas-Fermi Quark Model for Degenerate and Non-degenerate Mesonic Matter (EVIST Collaboration).

Dissertation/Thesis

Doctoral Thesis	Carrier Dynamics of ErAs:$GaAs_{1-x}Bi_x$ using infrared pump, Terahertz probe Spectroscopy (2025, expected).
M.Sc. Thesis	Thomas Fermi Quark Model in Combination with Mesonic and Baryonic Particles (2020).

Licenses & Certifications

- Advanced Learning Algorithms.
- Supervised Machine Learning: Regression and Classification
- Machine Learning with Scikit-Learn.
- Machine Learning Foundations: Calculus.
- Machine Learning Foundations: Linear Algebra.
- Machine Learning Foundations: Statistics.
- Machine Learning with Python: Foundations.
- Artificial Intelligence Foundations: Machine Learning.
- Foundations of Algorithmic Thinking with Python.

Trainings

- Materials Science with Python and Machine Learning.
- Density Functional Theory Calculation (DFT using Wein2k and QUANTUM ESPRESSO).
- Fundamentals of Laser Safety.
- Working with Lasers in Research.
- Compressed Gas Safety.
- Laboratory Safety - Chemical Hazards.
- Laboratory Safety - Physical Hazards.
- Cryogen Safety Training.
- Hazardous Waste Training.

Conferences, Seminars, Workshops and Presentations (Oral)

- *Optical and Electronic Properties of ErAs:$GaAs_{1-x}Bi_x$*
  Global Physics Summit, Anaheim, CA, USA, March 18, 2025.

- *Carrier Dynamics of ErAs:$GaAs_{1-x}Bi_x$ using Infrared Pump, Terahertz Probe Spectroscopy*
  APS March Meeting, Minnesota, USA, March 7, 2024.
- *Infrared Pump-Terahertz Probe Spectroscopy of ErAs:$GaAs_{1-x}Bi_x$*
  Baylor University, Waco, Texas, USA, September 2023.
- *High Spatial Resolution and Reflecting Microscopy*
  Baylor University, Waco, Texas, USA, March 2023.
- *Possibilities of Transient Phases in VO_2*
  Baylor University, Waco, Texas, USA, September 2022.
- *Enhancement of the Raman Signal and Inherent Background Suppression using Squeezed States of Light*
  Baylor University, Waco, Texas, USA, March 2022.
- *Sensitivity Enhancement of the Stimulated Raman Scattering Spectroscopy*
  Baylor University, Waco, Texas, USA, November 2021.
- *Deviation from Coherence Equality in Quantum Communications*
  Baylor University, Waco, Texas, USA, March 2021.
- *Investigation of Quark Distributions in a Family of Pentaquarks using the Thomas-Fermi Quark Model*
  Baylor University, Waco, Texas, USA, November 2020.
- *Thomas-Fermi Quark Model in Combination with Mesonic and Baryonic Particles*
  International Conference on Nanoscience and High Energy Physics (ICNHEP-2019), Kathmandu, Nepal, February 4–6, 2019.
- *Concepts of Negative Temperatures*
  Central Department of Physics, Tribhuvan University, Kathmandu, Nepal, 2017.
- *Global Warming and Climate Change*
  Chanakya High School, 2019.
- *Determination of Height of a High Building by Free Fall Method*
  Vedic School, 2018; Sringeri Higher Secondary School, 2019.

Teaching, Supervisory and Mentorship Experience

- **2021–Present:** Training undergraduate and graduate students in experimentation, data analysis, and interpretation in the Hilton's lab, Baylor University, Waco, Texas, United States.
- **2021:** Graduate Teaching Assistant, Physics, Baylor University, Waco, Texas, United States.
- **2020–2021:** Physics Instructor, Siddhi Ganesh Higher Secondary School, Sindhupalchowk, Nepal.
- **2018–2020:** High School Science and Mathematics Instructor, Various High Schools, Kath-

mandu, Nepal.

- **2016–Present:** Research Mentor, Everest Institute of Science and Technology (EVIST), Kathmandu, Nepal.
- **2016–2018:** Computational Mentor, Central Department of Physics, Tribhuvan University, Kathmandu, Nepal.

Awards

2025	Travel Award for the Global Physics Summit, Graduate School, Baylor University.
2024	Travel Award for the APS March Meeting, Graduate School, Baylor University.
2020–	Full tuition scholarship/Graduate Assistantship, Department of Physics, Baylor University.
2020	Best Mathematics Teacher, Chanakya School, 2020.
2019	Best Science Teacher, Vedic School, 2019.
2014	Best Trainee Bussiness Officer of the year, Qmed Pharmaceuticals, 2014.

Professional Affiliations

- Member, American Physical Society (APS).
- Member, National Science and Research Society (NSRS).
- Researcher, Everest Institute of Science and Technology (EVIST).

References

Available upon request.