

# YAMUNA PHAL

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| CONTACT INFORMATION | <i>Address:</i> Brown Hall, 1610 Illinois St Golden, CO 80401<br><i>Google Scholar:</i> <a href="#">[Link]</a> | <i>E-mail:</i> <a href="mailto:yphal[at]mines[dot]edu">yphal [at] mines [dot] edu</a><br><i>Web-site:</i> <a href="http://yamunaphal.com">http://yamunaphal.com</a> |
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| ACADEMIC APPOINTMENTS | <b>Colorado School of Mines</b> , Golden, USA<br><i>Assistant Professor, Department of Electrical Engineering</i> |
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**Colorado Clinical & Translational Sciences Institute (CCTSI)**, Aurora, USA  
*Affiliate Member*

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| EDUCATION | <b>University of Illinois Urbana-Champaign (UIUC)</b> , Urbana, USA<br>Ph.D. in Electrical & Computer Engineering (ECE) |
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**California Institute of Technology (Caltech)**, Pasadena, USA  
M.S. in Electrical Engineering (EE)

**Indian Institute of Technology (IIT) Roorkee**, Roorkee, India  
B.Tech. in Electrical Engineering (EE)

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| ACADEMIC AWARDS & FELLOWSHIPS | <b>Chirality Best Poster Award</b><br><b>William G. Fateley &amp; Coblenz Society Student Awards</b><br><b>Ernest A. Reid Fellowship, UIUC</b><br><b>NYU Tandon School of Engineering Faculty First Look Program</b><br><b>Global Young Scientists Summit</b><br><b>Cadence Women in Technology Program</b><br><b>FACSS SciX Best Poster Award</b><br><b>MIT EECS Rising Stars</b><br><b>Harriett &amp; Robert Perry Fellowship, UIUC</b><br><b>Nadine Barrie Smith Memorial Fellowship, UIUC</b><br><b>Harold L. Olesen Undergraduate Teaching Award, UIUC</b><br><b>List of Teachers Ranked as Excellent, UIUC</b><br><b>James M. Henderson Fellowship, UIUC</b><br><b>NASA Jet Propulsion Laboratory (JPL) Graduate Fellowship</b><br><b>Dr. Jai Krishna &amp; Director's Gold Medals, IIT Roorkee</b><br><b>The President of India, Dr. Shankar Dayal Sharma Gold Medal, IIT Roorkee</b> |
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| INDUSTRY EXPERIENCE | <b>Swedish Institute of Space Physics (IRFU)</b> , Uppsala, Sweden<br><i>Analog Research Design &amp; EMC Engineer   Radio &amp; Plasma Wave Investigation (RPWI), Jupiter Icy moons Explorer (JUICE) &amp; Solar Orbiter (SO) Missions</i> |
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**Finisar Malaysia Pvt. Ltd.**, Ipoh, Malaysia  
*Failure Analysis Engineer, Quality Analysis Department*

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| RESEARCH EXPERIENCE | <b>University of Illinois, Urbana-Champaign</b> , Urbana-Champaign, USA<br><i>Graduate Research Assistant, Biomedical Imaging   PI: Dr. Rohit Bhargava, Beckman Institute</i><br><i>Graduate Research Assistant, Remote Sensing &amp; Space Sciences</i> |
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**Johns Hopkins University Applied Physics Laboratory (APL)**, Laurel, USA  
*Visiting Researcher | PI: Dr. Larry Paxton, Head Geospace & Earth Science Group*

**NASA Jet Propulsion Laboratory (JPL)**, Pasadena, USA  
*Graduate Fellow | PI: Dr. Karl Rittger, Scientist Water and Carbon Cycles Group*  
*Graduate Research Assistant | PI: Dr. Keith Patterson, Senior Engineer Microdevices Lab*

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| PATENTS                    | Vibrational Circular Dichroism Infrared Spectroscopic Imaging Microscope<br><i>U.S. Patent US2022018759A1</i> [ <a href="#">Google Patents Search Link</a> ]  |
| PEER-REVIEWED PUBLICATIONS | P-H. Hsieh, <b>Y. Phal</b> , K. V. Prasanth, R. Bhargava, Cell Phase Identification in a Three-Dimensional Engineered Tumor Model by Infrared Spectroscopic Imaging<br><i>Analytical Chemistry</i> , DOI:10.1021/acs.analchem.2c04554   [ <a href="#">Link</a> ]<br><br><b>Y. Phal</b> , L. Pfister, P.S. Carney, R. Bhargava, Resolution Limit in IR Chemical Imaging<br><i>Journal of Physical Chemistry C</i> , DOI:10.1021/acs.jpcc.2c00740   [ <a href="#">Link</a> ]<br><b>Featured, Cover Image</b><br><br>L. Lux <sup>+</sup> , <b>Y. Phal</b> <sup>+</sup> , P-H. Hsieh, R. Bhargava, Parametric Approach to Determine Pixel-Wise Limit of Detection in Infrared Imaging<br><i>Invited Paper for Special Issue, Applied Spectroscopy</i> , DOI:10.1177/00037028211050961   [ <a href="#">Link</a> ]<br><sup>+</sup> Equal Contributions<br><br><b>Y. Phal</b> , K. Yeh, R. Bhargava, Chirality Mapping in Microscopy Format<br><i>Optics and Photonics News</i>   [ <a href="#">Link</a> ]<br><br><b>Y. Phal</b> , K. Yeh, R. Bhargava, Design Considerations for DFIR Microscopy Systems<br><i>Focal Point Review, Applied Spectroscopy</i> , DOI:10.1177/00037028211013372   [ <a href="#">Link</a> ]<br><b>Featured, Cover Image</b> [ <a href="#">Laser Focus World</a> ]<br><br><b>Y. Phal</b> , K. Yeh, R. Bhargava, Concurrent Vibrational Circular Dichroism Measurements with Infrared Spectroscopic Imaging<br><i>Analytical Chemistry</i> , DOI:10.1021/acs.analchem.0c00323   [ <a href="#">Link</a> ]<br><b>Featured, Cover Image</b> [ <a href="#">Drug Target Review</a> ] [ <a href="#">Photonics</a> ]<br><br>P. Joshi, <b>Y. Phal</b> , L. Waldrop, Quantification of the Vertical Transport and Escape of Atomic H in the Terrestrial Upper Atmosphere<br><i>Journal of Geophysical Research: Space Physics</i> , DOI:10.1029/2019JA027057   [ <a href="#">Link</a> ] |
| BOOK CHAPTER               | R-J. Ho, <b>Y. Phal</b> , L. Lux, R. Bhargava, Infrared Spectroscopy and Imaging Using QCLs<br><i>Molecular and Laser Spectroscopy: Advances and Applications, Volume 3</i> ,<br>DOI: 10.1016/B978-0-323-91249-5.00012-0  |
| CONFERENCE PROCEEDINGS     | <b>Y. Phal</b> , K. Yeh, R. Bhargava, Discrete Frequency Infrared VCD Spectroscopy & Imaging April 2021<br><i>2021 OSA Biophotonics Congress: Optics in the Life Sciences</i> , ISBN: 978-1-943580-85-9<br><br><b>Y. Phal</b> , K. Yeh, R. Bhargava, Polarimetric Infrared Spectroscopic Imaging Using QCL<br><i>Proc. SPIE 11252, Advanced Chemical Microscopy for Life Science and Translational Medicine</i> , 1125210, DOI: 10.1117/12.2544392<br><br><b>Y. Phal et al.</b> , Use of Fiber Optic Interconnects for Signal Integrity<br><i>2016 ESA Workshop on Aerospace EMC</i> , pp. 1-3. <i>IEEE</i> , DOI: 10.1109/AeroEMC.2016.7504561<br><br>J. Soucek, <b>Y. Phal et al.</b> , EMC Aspects of Turbulence Heating Observer (THOR) S/C<br><i>2016 ESA Workshop on Aerospace EMC</i> , pp. 1-3. <i>IEEE</i> , DOI: 10.1109/AeroEMC.2016.7504544   |
| CONFERENCE PRESENTATIONS   | R. Bhargava, K. Yeh, S. Kenkel, <b>Y. Phal</b> , K. Falahkheirkhah, Uncovering New Utility in IR Spectroscopic Imaging by Pushing the Limits of Accuracy, Speed, and Resolution<br><i>SPIE Photonics West 2023: Optical Biopsy – Toward Real-Time Spectroscopic Imaging and Diagnosis</i><br><br><b>Y. Phal</b> , K. Yeh, R. Bhargava, QCL-Based VCD Imaging for Biological Applications<br><i>Chiroptical Spectroscopy CD 2022</i> [Poster]<br><br><b>Y. Phal</b> , K. Yeh, R. Bhargava, Vibrational Circular Dichroism Spectroscopy & Imaging   |

*Chirality 2022* [Poster] | **Poster Award Winner**

R-J. Ho, **Y. Phal**, R. Bhargava, Understanding Polarization Effects On Absorption Spectra Measured Using A Quantum Cascade Laser-Based Spectrometer  
*International Symposium on Molecular Spectroscopy 2022*

**Y. Phal**, K. Yeh, R. Bhargava, VCD Imaging: New Tool to Examine Biological Materials  
*FACSS SciX 2021* [Poster] | **Poster Award Winner**

**Y. Phal**, R. Bhargava, R-J. Ho, K. Yeh, Vibrational Circular Dichroism Measurements Using IR Microscopes: Opportunities and Challenges  
*FACSS SciX 2021: Structure Elucidation of Chiral and Biological Molecules*

L. Lux, **Y. Phal**, P-H. Hsieh, R. Bhargava, Parametric Approach to Determine Pixel-Wise Limit of Detection in Infrared Imaging  
*FACSS SciX 2021* [Poster]

**Y. Phal**, K. Yeh, R. Bhargava, Mid-IR Laser-Based Polarimetric Imaging for Polymeric and Biological Applications  
*SPIE Photonics West 2021: Advanced Chemical Microscopy for Life Science and Translational Medicine*

R. Bhargava, S. Kenkel, **Y. Phal**, K. Yeh, Pushing the Limits of Spatial and Temporal Capability of Infrared Spectroscopic Imaging: a Theory-Based Approach  
*SPIE Photonics West 2021: Advanced Chemical Microscopy for Life Science and Translational Medicine*

K. Yeh, **Y. Phal**, R. Bhargava, Infrared Chemical Imaging with Scanning Quantum Cascade Laser Microscopy Systems  
*SPIE Photonics West 2021: Advanced Chemical Microscopy for Life Science and Translational Medicine*

R. Bhargava, K. Yeh, **Y. Phal**, S. Kenkel, Next generation infrared spectroscopy for micro and nanoscale chemical imaging  
*SPIE Defense & Commercial Sensing 2020: Advanced Sensing & Imaging*

R. Bhargava, K. Yeh, **Y. Phal**, S. Kenkel, Infrared Spectroscopic Imaging with QCLs  
*Pittcon Conference 2020*

**Y. Phal**, K. Yeh, R. Bhargava, Polarimetric Infrared Spectroscopic Imaging Using QCLs  
*SPIE Photonics West 2020: Advanced Chemical Microscopy for Life Science and Translational Medicine*

K. Yeh, **Y. Phal**, R. Bhargava, Design of QCL Microscopes for IR Chemical Imaging  
*SPIE Photonics West 2020: Advanced Chemical Microscopy for Life Science and Translational Medicine*

TEACHING  
EXPERIENCE

**University of Illinois, Urbana-Champaign**, Urbana-Champaign, USA  
**Harold L. Olesen Undergraduate Teaching Award & Ernest A. Reid Fellowship**

*Guest Lecturer, BIOE-570 Seminar Series*  
Seeing things in a different light

*Guest Lecturer, BIOE-507 Advanced Bioinstrumentation*  
Design & Development of Infrared Spectroscopic Imaging Systems [Virtual]

*Graduate Teaching Assistant, ECE 445 Senior Design Project Lab*

**Award Winning Projects:** [\[Link\]](#)

- **The Lextech Senior Design Best Engineered Project Award:** Prosthetic Control Board  
Caleb Albers (*Engineering Lead, Pliancy*) & Daniel Lee (*Systems Engineer, Texas Instr.*)
- **Area Award for Courage:** Cell Phone Transmission Detector  
Anish Bhattacharya (*Recipient of NSF GRFP, M.S./PhD., University of Pennsylvania*),  
Anthony Schroeder & Shandilya Pachgade (*Machine Learning Engineer, Bloomberg*)

- **Area Award for Recreation & Entertainment:** RC Boat Power & Signal Level Indicator  
Sanchit Anand, Vaibhav Mittal & Sho Harisawa
- **Area Award for Research:** Autonomous Motorized Mount for PATHS Sensor  
Brandon Bogue, Marvin Hernandez & Quoc Pham

#### Selected Notable Projects:

- Noninvasive PoC Anemia Detection Mythri Anumula (*Electrical Engineer, Borrego Solar Systems*) & Jeremy DeJournett (*Chief Technology Officer, Ideal Medical Technologies*)
- Conductive Fabric Gesture-Control Sleeve  
Guneev Lamba (*Associate, HGGC*), Mrunmayi Deshmukh (*GPU Firmware Engineer, NVIDIA*) & Stephanie Wang

*Graduate Teaching Assistant, ECE 468 Optical Remote Sensing*

- Designed and organized laboratory experiments for the class. Introduced and implemented a **LIDAR section** that used Garmin sensor for depth estimation and 3D mapping of the room.

#### California Institute of Technology

*Graduate Teaching Assistant, ACM 100A Introductory Methods of Applied Mathematics*

- Conducted recitation sessions for topics such as Complex Analysis & Ordinary Differential Equations

*Graduate Teaching Assistant, CH 1A-B General Chemistry*

- Graded exams and assignments for an undergraduate Chemistry course

#### STUDENT ADVISING EXPERIENCE

#### University of Illinois, Urbana-Champaign

*Student Mentor, Chemical Imaging & Structures Lab*

- Limit of Detection in IR imaging instrument  
Laurin Lux (*M.S., Technical University of Vienna*) | **Student Award, SciX 2021**
- Laser scanning IR microscope monitoring and control assembly  
Kevin So (*M.S., University of Wisconsin-Madison*) & Nathan Chung (*COO & Co-founder, Ferritina* | *M.S., Georgia Institute of Technology*)
- Standalone VCD spectroscopic instrument  
Eric Modesitt, Ru-Jing Ho (*Ph.D., University of Illinois, Urbana-Champaign*)

*Student Mentor, ECE 445 Senior Design Project*

- Active Feedback Control for Laser Pointing Stability  
Ruomu Hao (*M.S./Ph.D., Georgia Institute of Technology*), Sean White & Hao Yan

*Student Mentor, Promoting Undergraduate Research in Engineering (PURE)*

#### **Best Project Award for Promoting Undergraduate Research**

- Real Time Spectrum Sensing using SDR for Radio Frequency Interference (RFI) Analysis  
Min Kue Kim & Haozhong Guan (*M.S./Ph.D., University of Illinois, Urbana-Champaign*)
- RFI in Radar Data using DSP: A Software Approach  
Brian Chen & Amber Sahdev (*Software Engineer, Salesforce*)

*Mentor, Spectrometer SmallSat of Illinois & Indiana (SASSI) CubeSAT*

- Characterizing and Calibration of Imaging Spectrometer for Re-entry and Airglow  
Nicholas Zuiker (*M.S./Ph.D., University of Illinois, Urbana-Champaign*)

#### PROFESSIONAL SERVICE & OUTREACH

**SPARK, UIUC** | Panelist, *Faculty Job Applications – Research Statement*

**Scientific Reviewer**, Physica Scripta, Journal of Optics, Royal Society of Chemistry, Biosensors

**Career Center 2023, UIUC** | Panelist, *Success Story Panel*

**International Career Festival 2023, UIUC** | Panelist, *Alumni Panel*

**researchHStart 2022, UIUC** | Summer Workshop, *Light+Electronics*

**ECE Pulse Conference 2022, UIUC** | Panelist, *Women in Academia*

**Engineering Career Services, UIUC** | Panelist, *Ask Me Anything: Graduate School*

**Seminars & Talks Series, IIT Indore** | Invited Speaker, *Space Electronics*

**Career in Engineering, Girijabai Sail Inst. of Tech.** | Invited Speaker, *Emerging Tech.*