DR. RESHMA BEERAM

Assistant Professor in Physics

18acpp01@uohyd.ac.in | TGTWRDC, Mahabubabad, India, 506101
Mahabubabad, Telangana | reshmabeeram | 0000-0003-3539-4337
Reshma Beeram

My current job as an assistant professor at TGTWRDC allows me to promote scientific temper, encourage critical thinking, and foster curiosity among young tribal girls across Telangana.

EXPERIENCE

Assistant Professor

TGTWRDC, Telangana

July 2024 – | Mahabubabad, India

- Teaching a variety of courses in Physics to undergraduate students.
- Faculty Coordinator for The Kalpana program which aims to encourage young girls to continue their education in STEM.
- Faculty Coordinator for the Girl Boss program which aims to develop leadership and entrepreneurship among young girls.

Ph.D. Research

University of Hyderabad

Aug 2018 – Oct 2023 | Hyderabad, India

- Developing novel plasmonic materials (simulations and experiments) for SERS-based trace detection in a defence project for DRDO, India, resulting in 8 peer-reviewed publications and 5 international conference proceedings.
- Focused on using Python and machine learning algorithms for automation and translating lab research to the real field.
- Finite Element Method-based simulations using COMSOL multiphysics to understand plasmonic materials.
- Demonstrated experience as a teaching assistant and successfully trained interns and project associates.
- Hands-on experience working with ultrafast lasers, Raman systems, motorized stages, and material characterization techniques.
- Expertise in science writing and communication with a keen interest in popular science and outreach.
- Performed teaching assistant duties for supervisor and successfully guided three master theses and an intern.

Data Science Internship

Nuclei Technologies

Nov 2021 – Feb 2022 | Mumbai, India

- Applications of data science in the real world using R and Python.

Masters Thesis

University of Hyderabad

Dec 2016 – March 2017 | Hyderabad, India

- An interdisciplinary project studying Rheology of Chlamydomonas algae during different growth phases.

STRENGTHS

Experimental Design | Machine Learning | Ultrafast Lasers | Python | Scikit-learn | Pandas | Numpy | Keras | COMSOL | Gaussian | Origin | Matlab | Materials Characterization | Linux | Plasmonics | Raman Spectroscopy and Microscopy | LateX | R for data visualization

Data Analysis and Visualization | Teaching and Training | Written and Oral Communication | Science Writing | Time Management | Leadership | Independent Learner

MOST PROUD OF

Academic Excellence
Graduated PhD at the age of 26 with top grade and received free education through scholarships since 6^{th} Standard.

Awards
Best Oral and Poster presentations awards for the work presented during two international conferences.

Awards
Best thesis award at the National Laser Symposium-32, held at RRCAT.

Test Scores
Qualified for Graduate Aptitude Test in Engineering (GATE), CSIR-NET, Joint Entrance Screening Test (JEST) with all India ranks.

Equipment Maintenance
Responsible for maintaining and operation of high-end femtosecond lasers, optics and Raman spectroscopy systems

Nature Documentation
Documenting Birds and plants of Telangana.

EDUCATION

Ph.D. in Physics

University of Hyderabad

August 2018 – October 2023

Integrated Masters in Physics

University of Hyderabad

Aug 2012 – Jun 2017

RESEARCH PROJECTS

Deep Learning Approach To Overcome Signal Fluctuations in SERS

University of Hyderabad

- Objective: To bridge the gap between laboratory and field performance in SERS based detection.

Ultrafast Laser Ablated Nanomaterials as Plasmonic Sensors.

University of Hyderabad

- Objective: To fabricate highly periodic and reproducible SERS substrates.

Machine Learning for Rapid Quantification in SERS

University of Hyderabad

- Objective: To quantify trace molecules in SERS within 10 seconds.

Low-cost, Flexible, and Durable Plasmonic Materials

University of Hyderabad

- Objective: To fabricate large scale, cost efficient and durable plasmonic materials using Si etching techniques.

SERS Based Bacteria Detection

University of Hyderabad

- Objective: To establish the versatility of SERS through the detection of different species of E.Coli.

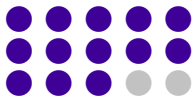
PUBLICATIONS

Journal Articles

1. **Reshma Beeram**, V. S. Vendamani, and Venugopal Rao Soma. "Deep learning approach to overcome signal fluctuations in SERS for efficient On-Site trace explosives detection." Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 289 (2023): 122218.

LANGUAGES

English
Telugu
Hindi



LIFE PHILOSOPHY

"Somewhere something incredible is waiting to be known."

Notable Conference Proceedings

1. **Reshma Beeram**, Dipanjan Baneerjee, and Soma Venugopal Rao. "Sand Dune Like Copper Nanostructures Fabricated by Femtosecond Laser Ablation for Trace Explosive Detection." In Frontiers in Optics/Laser Science 2022, 16^{th} - 20^{th} October, Rochester, New York, USA., Optica Publishing Group, 2022.
2. **Reshma Beeram**, V. S. Vendamani, and Soma Venugopal Rao. "Flexible Paper Substrate with Silver Dendrites for Trace Detection of Dye and Explosive Molecules using SERS." In Workshop on Recent Advances in Photonics (WRAP), 04^{th} March- 06^{th} March, 2022, IIT Bombay, IEEE, 2022.
3. **Reshma Beeram**, and Soma Venugopal Rao. "Studies on Effects of Size, Morphology and Composition in Ag, Au and Ag-Au Plasmonic Nanoparticles." International Conference on Recent Trends in Photonics (NPS 2021), 27^{th} February- 1^{st} March, International School of Photonics, Cochin University of Science and Technology.
4. Banerjee, Dipanjan, **Reshma Beeram**, and Venugopal Rao Soma. "Ultrafast Bessel Beam Induced Finger-like Silver Nanostructures for Trace-level Picric Acid Sensing." In Frontiers in Optics/Laser Science 2022, 16^{th} - 20^{th} October, Rochester, New York, USA., Optica Publishing Group, 2022.
5. **Reshma Beeram**, Dipanjan Banerjee, A. Mangababu, and Soma Venugopal Rao, "Femtosecond Laser Processed Web-like Silicon Nanostructures and Application in Surface Enhanced Raman Spectroscopy." In Conference on Lasers and Electro-Optics,Pacific Rim (CLEO-PR), Sapporo, Japan, 31^{st} July- 5^{th} August, Optica Publishing Group, 2022.

CERTIFICATIONS

- **Introduction to Data Science in Python by University of Michigan** on Coursera.
- **Machine Learning by Stanford University** on Coursera

COURSES FINISHED

Mechanics, Vibrations and Waves, Electricity, Magnetism, and Electromagnetic Theory, Properties of Matter, Kinetic Theory and Thermodynamics, Optics, Modern Physics, Atomic and Molecular Physics, Relativity

2. **Reshma Beeram**, and Venugopal Rao Soma. "Ultra-trace detection of diverse analyte molecules using femtosecond laser structured Ag–Au alloy substrates and SERRS." Optical Materials 137 (2023): 113615.
3. **Reshma Beeram**, Kameswara Rao Vepa, and Venugopal Rao Soma. "Recent trends in SERS-based plasmonic sensors for disease diagnostics, biomolecules detection, and machine learning techniques." Biosensors 13(2023): 328.
4. Vendamani, V. S., **Reshma Beeram**, and Venugopal Rao Soma. "MoS_2 nanosheets decorated plasmonic silicon nanowires as SERS substrates for ultra-sensitive multiple analyte detection." Journal of Alloys and Compounds 959 (2023): 170573.
5. Vendamani, V. S., **Reshma Beeram**, SVS Nageswara Rao, and Soma Venugopal Rao. "Protocol for designing AuNP-capped Ag dendrites as surface-enhanced Raman scattering sensors for trace molecular detection." STAR protocols 4(2023): 102068.
6. Byram, Chandu, Sree Satya Bharati Moram, Dipanjan Banerjee, **Reshma Beeram**, Jagannath Rathod, and Venugopal Rao Soma. "Review of ultrafast laser ablation for sensing and photonic applications." Journal of Optics 25(2023): 043001.
7. **Reshma Beeram**, Dipanjan Banerjee, Linga Murthy Narlagiri, and Venugopal Rao Soma. "Machine learning for rapid quantification of trace analyte molecules using SERS and flexible plasmonic paper substrates." Analytical Methods 14 (2022): 1788.
8. Vendamani, V. S., **Reshma Beeram**, SVS Nageswara Rao, A. P. Pathak, and Venugopal Rao Soma. "Trace level detection of explosives and pesticides using robust, low-cost, free-standing silver nanoparticles decorated porous silicon." Optics Express 29(2021): 30045.
9. Vendamani, V. S., **Reshma Beeram**, M. M. Neethish, SVS Nageswara Rao, and S. Venugopal Rao. "Wafer-scale silver nanodendrites with homogeneous distribution of gold nanoparticles for biomolecules detection." iScience 25(2022): 104849.
10. Narlagiri, Linga Murthy, M. S. S. Bharati, **Reshma Beeram**, Dipanjan Banerjee, and Venugopal Rao Soma. "Recent trends in laser-based standoff detection of hazardous molecules." TrAC, Trends in Analytical Chemistry 153 (2022): 116645.
11. **Reshma Beeram**, and Venugopal Rao Soma. "Femtosecond laser structured ripple like nanostructures on Ag for the detection and classification of explosives and bacteria." In editing stage.

Popular Science

1. Submitted a popular science article titled "Sir CV Raman wishing you a safe journey from our lab", for Augmenting Writing Skills for Articulating Research (AWSAR), DST. **Reshma Beeram**

and advent of Quantum Mechanics, Classical Mechanics, Quantum Mechanics, Particle Physics, Mathematical Physics, Field Theory and Quantum Electrodynamics, Statistical Mechanics, Electronics, Condensed Matter Physics, Research Methodology, Experimental Methods in Physics, Introduction to Laser Physics, Signals and Systems, Lie algebra and Lie groups, Nuclear Physics, General Properties of Matter

COURSES HANDLED

- Electromagnetic Theory
- Fundamentals of Nanotechnology
- Water Resource Management
- Waves and Optics
- Thermal Physics

ACTIVITIES

- Volunteer at Centre for Sustainable Agriculture
- Mentoring young school girls from farmers' suicide families to achieve their goals.
- Marathons, and yoga
- Amateur bird and tree watcher and organised bird walks for children
- Contributing for a climate change project in Season Watch by recording data of seasonal changes in local trees
- Chess player representing the university.