

Prashant Bhaskar, Ph.D.

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PROFILE

I am an experimental and computational physicist with post-doctoral research experience at ISRO and PhD training from TU Delft, specializing in semiconductor physics, low-dimensional materials, optoelectronic devices, and multiscale TCAD modelling. My research integrates first-principles theory, device-level simulation, and advanced spectroscopy, enabling end-to-end PhD training from fundamental physics to applied device engineering.

RESEARCH INTERESTS

Experimental and Computational Condensed Matter Physics, Materials & Device Physics, Low-dimensional van der Waals materials, Optoelectronics, Semiconducting and metallic nanomaterials, DFT and TCAD simulations of space-grade solar cells, Pulse-radiolysis, Radiation degradation of materials

CURRENT POSITION Assistant Professor

| Patna, IN

Jan '25 to Present

Department of Physics, A.N. College (Patliputra University)

- Key responsibilities include lecturing undergraduate and postgraduate physics, supervising research projects, and contributing to the departmental curriculum development and activities.

EXPERIENCE

July '22 to Present

Research Associate

Indian Space Research Organisation (ISRO) – U.R. Rao Satellite Centre (URSC)

| Bengaluru, IN

- Simulated lattice-matched **triple-junction solar cells** (InGaP/InGaAs/Ge) and **inverse metamorphic cells** using TCAD software to optimize performance for space applications
- Led design and enhancement of power conversion **efficiency by 20%** through layer thickness and doping optimization, reaching a **total of 35%** (compared to approx. 31% in commercially available cells)
- Integrated quantum well structures and distributed Bragg reflectors to further improve efficiency in radiation-rich environments
- Elucidated defect formation and I-V characteristics in cells under exposure to electron/proton radiation
- Optimized GaAs etching process for front contact metallization
- Designed and optimized anti-reflective coatings for AM0 transmission enhancement of 4%

Research and Analytical Skills: **Crosslight APSYS TCAD**, Silvaco ATLAS and Athena, SRIM/TRIM package, ANSYS Lumerical, COMSOL Multiphysics, Origin, **Python**

Jan '21 to June '22

Assistant Professor

Department of Physics Patna Women's College (Autonomous)

| Patna, IN

- Instructed core Physics courses to undergraduates and postgraduates and supervised them on DST-funded projects:(a) Python programming for envisaging Simple Quantum Mechanical Systems, (b) COMSOL model for anticipating Plasmonic Properties of Metallic Nanoparticles (c) Band Structure of Semiconductor Materials Using Density Functional Theory

Research and Analytical Skills: **Quantum Espresso**, COMSOL Multiphysics, Python

Nov '18 to May '19

Visiting Researcher

Technische Universiteit Delft (TU Delft)

| Delft, NL

- Tested the set-up of the **Advanced Picosecond Electron Accelerator** by measuring transient absorption in DI water, ZnO and ZnS at **W-band microwave** frequencies

Research and Analytical Skills: Pico-second electron accelerator, Ultrafast Pump-probe spectroscopy and conductivity measurements

EDUCATION

Nov '14 to Oct '18

Technische Universiteit Delft (TU Delft), PhD Researcher

| Delft, NL

Thesis: **Mobility & Recombination Dynamics of Charges in Low-Dimensional van der Waals Materials**, Promoter and Supervisor: **Prof. Dr Laurens D.A. Siebbeles**, Co-supervisor: **Dr. Alexander A.W. Achtstein**

- Led experimental studies on semiconductor materials and conjugated polymers using high-energy pulsed-electron irradiation (nano- and pico-second), femtosecond laser pump to probe **microwave (K_a-band)**, optical absorption along with pre-and post-irradiation electronic and structural analyses
- Developed kinetic and quantum-level models to explain fundamental optoelectronic phenomena occurring within van der Waals materials

Research and Analytical Skills: van der Waals materials, kinetic modelling, electron accelerator, **transient microwave conductivity**, ultra-high vacuum, optical pump – white-light probe and **terahertz probe**, optical absorption, fluorescence, FTIR, Mathematica, Igor Pro, Amsterdam Density Functional -BAND, SRIM/TRIM package, Adobe Illustrator

Sep '09 to June '14

Indian Institute of Science Education & Research (IISER)

BS-MS (Dual Degree) Degree (Majors: Physics, Minors: Chemistry),
CGPA 8.0/10.0

| Pune, IN

Master's Thesis: Exciton-Plasmon Interaction in Au-CdTe Nanostructures, Supervisor: **Prof. Dr Sulabha K. Kulkarni**

Collaborative work: Attomolar detection of analytes e.g., glucose and TNT molecules via self-assembled vertically aligned gold nanorods using enhanced surface plasmon resonance and Raman spectroscopy

Research and Analytical Skills: **Nanomaterial syntheses (wet-chemical) and sample preparation**, absorption and **fluorescence spectroscopy**, X-ray Diffraction (XRD), time-correlated single photon counting (**TCSPC**), **SEM**, TEM, Raman spectroscopy, Origin, ImageJ

LEADERSHIP

- 2026, Teacher Representative, Internal Quality Assessment Committee (IQAC), A.N. College, Patna
- 2025, Member, Central Instrumentation Center (CIC), A.N. College, Patna
- 2025, Nodal Officer, Website Updation & Maintenance, A.N. College, Patna
- 2025, Member, Institution Innovation Council (IIC), A.N. College, Patna
- 2021, Coordinated a session on "Codes of Ethical Student Conduct: Best Values & Responsibilities at Patna University"
- 2013-2015, Led collaborative research projects on Plexciton studies of conjugated nanoparticles at IISER Pune, Trion generation and detection at Technische Universiteit Delft in collaboration with Technische Universität Berlin and Utrecht Universiteit

AWARDS & ACHIEVEMENTS

- DOS – ISRO Research Associateship (2022 – 2023, 2023 – 2024, 2024 – 2025)
- The Dutch Research Council (NWO) fellowship for PhD (2014 – 2018)
- DST-INSPIRE Fellowship for Integrated Masters (2009 – 2014)
- Ranked among top 3% of 0.3 million candidates in the Joint Entrance Examination (JEE-2008) conducted by Indian Institute of Technology (IIT)

PUBLICATIONS

Publications:

- Investigating the impact of parametric optimization on efficiency and radiation degradation performance of triple junction InGaP/InGaAs/Ge solar cells
P. Bhaskar, B.P. Dhamaniya, K.P. Ganesan
Journal of Computational Electronics 24(5), **2025**, 1-15
- Unconventional thermally activated indirect to direct radiative recombination of electrons and holes in tin disulphide two-dimensional van der Waals materials
P. Bhaskar, A.W. Achtstein, M.J.W. Vermeulen, L.D.A. Siebbeles
The Journal of Physical Chemistry C 123(18), **2019**, 11968 -11973
- Charge mobility and recombination mechanisms in tellurium van der Waals solids
P. Bhaskar, A.W. Achtstein, M.J.W. Vermeulen, L.D.A. Siebbeles
The Journal of Physical Chemistry C 123(1), **2018**, 841-847
- Mobility and decay dynamics in one-dimensional selenium van der Waals solid
P. Bhaskar, A.W. Achtstein, S.L. Diedenhofen, L.D.A. Siebbeles
The Journal of Physical Chemistry C 121(34), **2017**, 18917-18921
- Radiatively Dominated Charge Carrier Recombination in Black Phosphorus
P. Bhaskar, A.W. Achtstein, M.J.W. Vermeulen, L.D.A. Siebbeles

- A strain-induced exciton transition energy shift in CdSe nanoplatelets: the impact of an organic ligand shell
A. Antanovich, A.W. Achtstein, A. Matsukovich, A. Prudnikau, **P. Bhaskar**, V. Gurin, M. Molinari, M. Artemyev
Nanoscale 9(45), **2017**, 18042-18053
- Self-assembled vertically aligned nanorod superlattices for ultra-high sensitive detection of molecules
A. Apte, **P. Bhaskar**, R. Das, S. Chaturvedi, P. Poddar, S. Kulkarni
Nano Research 8(3), **2015**, 907-919
- Vertically Aligned Self-Assembled Gold Nanorods as Low Turn-on, Stable Field Emitters
A. Apte, P. Joshi, **P. Bhaskar**, D. Joag, S. Kulkarni
Applied Surface Science 355, **2015**, 978-983
- Photovoltaic power availability on Mars: Implications of landing site and launch window for mission planning
Uma B.R., P. Yash, **P. Bhaskar**
Submitted to IEEE Aerospace and Electronic Systems Magazine, **2026**

CONFERENCE PRESENTATIONS & WORKSHOPS

- 2025: UGC-Sponsored 9th Faculty Induction Programme organized by Malviya Mission Teacher Training Programme (MM-TTP) of University Grants Commission (UGC), Patna University, Patna from 19.08.2025 to 18.09.2025, Patna, India
- 2025: NEP 2020 Orientation & Sensitization Programme under Malviya Mission Teacher Training Programme (MM-TTP) of University Grants Commission (UGC), Patna University, Patna from 20.06.2025 to 30.06.2025, Patna, India
- 2025: Materials Square Webinar 138, Materials Square (Online)
- 2022: National Science Day Programme, Inter-University Accelerator Centre, New Delhi (Online)
- 2022: National Webinar on Understanding Research Ethics: The Principles and Practices, organized by IQAC, Patna Women's College, Patna, India
- 2022: RUSA sponsored Six Day Workshop on Capacity Building for IQAC functioning & Accreditation Process, organized by IQAC, Patna Women's College, Patna, India
- 2016-2018: Physics@Veldhoven, Dutch Research Council, The Netherlands
- 2016-2018: CHAINS Meeting@Veldhoven, Veldhoven, The Netherlands
- 2018: TULIP VII Summer School on "Modern Developments in Spectroscopy" Holland Research School of Molecular Chemistry, The Netherlands,
- 2017: MRS Meeting Spring, Materials Research Society (MRS), Phoenix, The USA
- 2016: Sol2D: Solution-based Two-dimensional Nanomaterials, Germany
- 2016: Phonsi, Theory of Quantum Dots, Lille, France
- 2016: 2D Layered Materials (Summer School), ETH Zurich & EPF Lausanne, Switzerland