Dr. Reetesh Kumar Gangwar

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Institute profile · Lab: ppliittp.com · Google Scholar
ResearchGate · LinkedIn



50+	1,434	3 + 5	₹ 3.58 Cr	2
journal papers	citations h-index 18	Ph.D. students graduated + ongoing	research funding 9 projects, PI on 5	patent filings

Citation figures: Google Scholar, October 2026.

RESEARCH INTERESTS

- Design and development of low-temperature plasma systems
- Optical diagnostics of plasmas and quantitative analysis of reactive species
- Quantum-mechanical calculation of cross sections and plasma population-kinetic modelling
- Classical and quantum algorithm-based plasma simulation
- Machine learning applications in plasma diagnostics and data analysis
- Plasma-based systems for water and wastewater treatment, agriculture and food processing

PROFESSIONAL EXPERIENCE

01/2024 – present **Associate Professor**, Department of Physics, IIT Tirupati
11/2018 – 12/2023 **Assistant Professor**, Department of Physics, IIT Tirupati
03/2018 – 11/2018 **Assistant Professor**, Visvesvaraya National Institute of Technology (VNIT), Nagpur
03/2016 – 03/2018 **Postdoctoral Researcher**, Weizmann Institute of Science, Rehovot, Israel
11/2012 – 03/2016 **Postdoctoral Researcher**, Université de Montréal, Montréal, Canada

EDUCATION

2008 – 2012 **Ph.D. in Physics**, Indian Institute of Technology Roorkee
Thesis: *Study of collisional processes in atomic systems* (theoretical atomic and molecular physics, plasma physics)

PROFESSIONAL SERVICE

Major administrative responsibilities at IIT Tirupati

06/2025 – present **Advisor, Outreach** (equivalent to Associate Dean)
2025 batch **Faculty Advisor**, M.Sc. Physics
06/2021 – 06/2024 **Head, Department of Physics**
08/2019 – 08/2021 **Hostel Warden**

Service to the scientific community

10/2026 – present **Editorial Board Member, Plasma Sources Science and Technology** – IOP Publishing [link]
Editorial **Guest Editor**, *IEEE Transactions on Plasma Science*, Special Issue on PLASMA 2025 (40th PSSI National Symposium) [link]
Societies **Executive Board Member**, Plasma Science Society of India and Power Beam Society of India
Conferences **Scientific Advisory Committee**, ISPC 2025, PLASMA 2024, PLASMA 2023 and other conferences

Reviewing — **Reviewer** for IEEE, Elsevier, Wiley, IOP Publishing, Springer Nature and APS journals; **examiner** for Ph.D. theses and project proposals

RESEARCH FUNDING

Sponsored research projects

2026 – 2029 — **DST, National Quantum Mission (NQM)** — Co-PI · ₹ 70.64 lakh · Ongoing
Quantum machine learning: Reservoir computing and PDE solvers

2025 – 2026 — **SS Deepam Biotek Pvt. Ltd.** — Co-PI · ₹ 25.06 lakh · Ongoing
Atmospheric nonthermal plasma-based liquid fertilizer as a natural growth enhancer and biocidal agent

2024 – 2027 — **DST-SERB, Core Research Grant** — PI · ₹ 53.61 lakh · Ongoing
A novel nonthermal atmospheric pressure plasma reactor for the prevention of aflatoxin in food and agriculture products

2023 – 2028 — **DST, Centre of Excellence** — Co-PI · ₹ 97.36 lakh · Ongoing
Membrane technologies for desalination, brine management and water recycling

2023 – 2026 — **DAE-BRNS** — PI · ₹ 17.22 lakh · Completed
An atomic processes database using calculation and measurement in tokamak and laboratory plasmas

2020 – 2021 — **DST-SERB, Special Call on COVID-19** — PI · ₹ 20.10 lakh · Completed
A portable optical cavity sterilization unit

2019 – 2022 — **DST-SERB, Core Research Grant** — PI · ₹ 24.45 lakh · Completed
A novel scheme to cool the translational and internal degrees of freedom of any molecular ion beam

Industry consultancy

2025 — **FaradayEarth Pvt. Ltd.** — PI · ₹ 2.36 lakh · Completed
Optical diagnostics of an industry preparatory atmospheric-pressure plasma reactor and feasibility of ML-based optical diagnostics

2024 – 2025 — **Ozone Research and Applications India Pvt. Ltd.** — Co-PI · ₹ 47.59 lakh · Completed
Atmospheric nonthermal plasma-based liquid fertilizer as a natural growth enhancer and biocidal agent

PUBLICATIONS, 2024 – 2026

Bold: R. K. Gangwar. Underlined: students and postdoctoral fellows supervised. Complete list on Google Scholar.

Under review

- K. Paul, R. V, S. Aravinda and **R. K. Gangwar**, "Efficient quantum simulation of linearized Vlasov–Poisson dynamics using Trotter and THRIFT Hamiltonian simulation methods", arXiv:2608.23127 (2026). [link]
- R. Dey, A. Agarwal, **R. K. Gangwar**, D. Sharma, M. B. Chowdhuri, R. Srivastava and J. Ghosh, "Relativistic calculations of electron impact excitation cross-sections of neutral tungsten", arXiv:2603.02612 (2026). [link]

Journal articles – 2026

- T. Pushparaj Gandhi, S. Pal, S. Maniteja, **R. K. Gangwar** and S. M. Maliyekkal, "Synergistic falling film nonthermal plasma and UV-photon hybrid system: An advanced and energy-efficient approach for rapid dye degradation", *Separation and Purification Technology* (2026). doi:10.1016/j.seppur.2026.140781
- S. B. Thota, P. S. N. S. R. Srikar, S. Mathengattil, S. M. Maliyekkal and **R. K. Gangwar**, "Phase-resolved optical diagnostics of waveform-modulated Ar nonthermal atmospheric pressure plasma jet", *Spectrochim. Acta B*, 107649 (2026). [link]
- M. G. B. Narayana, I. Suresh and **R. K. Gangwar**, "Calculation of fine structure resolved electron impact excitation cross sections of Al I using relativistic distorted wave method", *IEEE Trans. Plasma Sci.* (2026). [link]
- R. Dey, I. Suresh, D. Sharma, M. B. Chowdhuri, *et al.*, R. Srivastava, J. Ghosh and **R. K. Gangwar**, "Fine-structure resolved electron impact excitation of O IV and O V: A comprehensive relativistic study for plasma modeling and diagnostics", *J. Phys. B: At. Mol. Opt. Phys.* **59** (14) (2026). doi:10.1088/1361-6455/ae872a
- A. Jayanarasimhan, A. U. Shetty, D. Dhanabal, S. Acharya, K. V. S. S. Bhargavi, **R. K. Gangwar**, D. Saha and S. Ranjan, "Warm non-equilibrium plasma-assisted catalysis for sustainable ammonia synthesis", *Green Chem.* **28**, 8757–8765 (2026). [link]

- V. Bende, P. S. N. S. R. Srikar, **R. K. Gangwar**, R. L. Bhardwaj and R. Kar, "A semi-empirical approach to Boltzmann plot analysis for cold atmospheric pressure plasma: Comparison with collision-radiative modelling", *Vacuum*, 115263 (2026). doi:10.1016/j.vacuum.2026.115263
- R. Dey, A. Agrawal, **R. K. Gangwar**, D. Sharma, R. Srivastava, M. B. Chowdhuri and J. Ghosh, "Simulation study of neutral tungsten emissions for fusion applications", *Plasma Fusion Res.* **21**, 2403022 (2026). doi:10.1585/pfr.21.2403022

Journal articles – 2025

- P. S. N. S. R. Srikar, I. Suresh and **R. K. Gangwar**, "Machine learning-enabled prediction of optical emission spectra in scalable non-thermal Ar atmospheric pressure plasma multi jet", *J. Phys. D: Appl. Phys.* **58**, 415204 (2025). doi:10.1088/1361-6463/ae0b81
- T. Pushparaj Gandhi, M. G. C. Pavan Sai, S. M. Allabakshi, **R. K. Gangwar** and S. M. Maliyekkal, "Transforming antibiotic treatment: Unleashing the nexus between UV photons and nonthermal atmospheric pressure air plasma in pharmaceutical wastewater", *J. Environ. Chem. Eng.* **13**, 119160 (2025). [link]
- V. Bende, V. Nagar, P. S. N. S. R. Srikar, **R. K. Gangwar**, D. Bhale, R. L. Bhardwaj and R. Kar, "Reactive species dynamics and bactericidal mechanisms in cold atmospheric pressure plasma with gas admixtures", *Vacuum* **239**, 114393 (2025). [link]
- T. Pushparaj Gandhi, P. S. N. S. R. Srikar, S. M. Allabakshi, **R. K. Gangwar** and S. M. Maliyekkal, "Removal of aflatoxin B1 from solid and liquid matrices using cold atmospheric plasma reactors: Insights into reactor configurations and food quality testing", *Innov. Food Sci. Emerg. Technol.*, 104203 (2025). [link]
- P. Kumar, P. S. N. S. R. Srikar, D. Dahatonde, **R. K. Gangwar** and T. Nallamilli, "Effect of atmospheric pressure cold plasma treatment on charge, structure, thermal properties and coacervation behavior of pea protein isolate with alginate", *Innov. Food Sci. Emerg. Technol.* **101**, 103948 (2025). [link]

Journal articles – 2024

- S. M. Allabakshi, P. S. N. S. R. Srikar, S. Gomosta, **R. K. Gangwar** and S. M. Maliyekkal, "Treatment of textile dyes in a photo-surface dielectric barrier discharge hybrid reactor: Unraveling the degradation mechanisms", *Chemosphere* **368**, 143775 (2024). [link]
- I. Suresh, P. S. N. S. R. Srikar and **R. K. Gangwar**, "Integration of ML methods with CR model-based optical diagnostic for the estimation of electron temperature in Ga laser produced plasma", *Phys. Plasmas* **31**, 113501 (2024). [link]
- P. S. N. S. R. Srikar, S. M. Allabakshi, S. Gomosta, S. M. Maliyekkal and **R. K. Gangwar**, "Development of efficient non-thermal atmospheric-pressure Ar-plasma jet through simultaneous spectroscopic characterization and radical quantification", *J. Phys. D: Appl. Phys.* **57**, 395204 (2024). doi:10.1088/1361-6463/ad5c76
- P. S. N. S. R. Srikar, I. Suresh and **R. K. Gangwar**, "Accelerated real-time plasma diagnostics: Integrating argon collisional-radiative model with machine learning methods", *Spectrochim. Acta B* **215**, 106909 (2024). [link]
- S. A. A. Balkhi, S. M. Allabakshi, P. S. N. S. R. Srikar, S. Gomosta, **R. K. Gangwar** and S. M. Maliyekkal, "Unwinding the correlation between atmospheric pressure plasma jet operating parameters and variation in antibiotic wastewater characteristics", *J. Water Process Eng.* **60**, 105186 (2024). [link]
- I. Suresh, R. Srivastava and **R. K. Gangwar**, "Fully relativistic distorted wave calculations of electron impact excitation of gallium atom: Cross sections relevant for plasma kinetic modeling", *Spectrochim. Acta B* **213**, 106860 (2024). [link]
- I. Suresh, Priti, R. Srivastava and **R. K. Gangwar**, "Fine structure resolved excitation cross sections of singly ionized Ga for the modeling and diagnostics of Ga plasmas", *Plasma Sources Sci. Technol.* **33**, 025018 (2024). doi:10.1088/1361-6595/ad27ec

Book chapter – 2025

- S. M. Allabakshi, P. S. N. S. R. Srikar, **R. K. Gangwar** and S. M. Maliyekkal, "Nonthermal plasma technology for degradation of dyes in wastewater", in *Innovative and Hybrid Advanced Oxidation Processes for Water Treatment*, Elsevier, pp. 255–278 (2025). [link]

Patents

- S. M. Maliyekkal, **R. K. Gangwar**, S. M. Allabakshi, P. S. N. S. R. Srikar and A. Kumar, "Chemo-photo-plasma hybrid advanced oxidation process for ultrafast removal of environmental pollution" (invention disclosure submitted)
- S. M. Maliyekkal, S. Soujit, G. Vajitha, P. S. N. S. R. Srikar and **R. K. Gangwar**, "Plasma-UV assisted bulk production of graphenic material with tunable surface area and porosity" (complete patent application filed)

TEACHING AT IIT TIRUPATI

Code	Course	Semesters taught (latest first)
Undergraduate		
PH301P	Applied Optics and Material Physics Laboratory	Jul–Dec 2026
PH105L	Introduction to Quantum Science and Technology	Jul–Dec 2026, 2025, 2024
PH001L	Physics Preparatory Course	Jul–Dec 2023
PH1103 / PH103P	Physics Laboratory	Jul–Dec 2025, 2022, 2019 · Jan–Jun 2024, 2023, 2021, 2020, 2019 · Summer 2023, 2022
PH1202	Introduction to Electrodynamics and Quantum Mechanics	Jan–Jun 2020, 2019
PH1101	Introduction to Classical Mechanics	Jul–Dec 2019
Postgraduate and Ph.D.		
PH605L	Basics and Applications of Plasma Physics	Jul–Dec 2026, 2025, 2024, 2021, 2020, 2019 · Jan–Jun 2024, 2023, 2022
PH511L	Quantum Mechanics II	Jan–Jun 2026, 2025
PH507L	Mathematical Physics II	Jan–Jun 2024, 2023, 2022, 2021
PH702L	Foundations of Experimental Physics	Jan–Jun 2024, 2023, 2022
PH603P	Advanced Physics Laboratory	Jul–Dec 2024, 2023
PH508P	Physics Laboratory I	Jul–Dec 2024, 2023
PH691G	Project Phase I	Every Jul–Dec semester, 2021 – present
PH692G	Project Phase II	Every Jan–Jun semester, 2022 – present

RESEARCH SUPERVISION

Ph.D. graduates (3)

2020 – 2025 **Dr. Indhu Suresh** — now Postdoctoral Researcher, ITER-India
Relativistic calculation of cross sections for electron-induced processes and their application in optical plasma diagnostics and machine learning methods

2019 – 2025 **Dr. P. S. N. S. R. Srikar** — now Plasma–Neutral Interactions Physicist, UKAEA
Characterization and application of atmospheric pressure plasmas by integrating optical spectroscopy with generalized population-kinetic models and machine learning methods

2019 – 2024 **Dr. S. M. Allabakshi** (joint, with Dr. S. M. Maliyekkal) — now Postdoctoral Scientist, CAES, USA
Development of a novel nonthermal atmospheric pressure photo-plasma reactor for efficient treatment of textile wastewater

Ph.D. scholars, ongoing (5)

2024 – present **Mr. Shriyash Vilas Patil** – *Machine learning in plasma diagnostics*

2024 – present **Mr. M. Guru Bhavan Narayana** – *Machine learning in plasma modelling and diagnostics*

2024 – present **Mr. Abhay Kumar** – *Plasma-based wastewater treatment* (joint)

2022 – present **Mr. T. Satish Babu** – *Plasma-assisted synthesis and alteration of materials* (joint)

2022 – present **Mr. T. Pushparaj Gandhi** – *Plasma treatment of mycotoxin-contaminated food* (joint)

Joint supervision with Dr. Shihabudheen M. Maliyekkal, IIT Tirupati.

Postdoctoral fellow

Dr. Ritu Dey – *Cross-section calculations using relativistic distorted-wave (RDW) theory*

M.S. (Research)

Ms. Akhila K. C. (IISER Tirupati)

Master's and project students

M.Tech. / M.S. / Project

Ms. Shanila M. (Project)
Ms. Somya Pal (M.Tech.)
Mr. Rahul Kumar (M.Tech.)
Ms. Priyanshi Chauhan (Project)
Mr. Jerin Abraham George (M.S.)
Ms. Syed Arwa Balkhi (M.Tech.)
Ms. Palli Priyanka (M.Tech.)

M.Sc.

Mr. Kartik Paul
Mr. Diwaskar Rai
Mr. Akash Uniyal
Ms. Anamika
Ms. Chebrolu Rajyalakshi
Mr. Debabrat Rout
Ms. Saroj Meena
Ms. Sajal Soan
Ms. Muskan
Mr. Amit Kumar Jangid
Mr. Rahul Samriya

INVITED TALKS AND OUTREACH

Apr 2026	**Keynote**: *Atmospheric pressure plasma: A sustainable platform for next-generation technologies*, Int. Conf. on Advanced Functional Materials & Quantum Science for Sustainable & Smart Technologies, KL University
Dec 2025	*Feasibility of data-driven approaches in optical diagnostics of non-equilibrium plasmas*, 2nd National Symposium on Gaseous Discharges (NSGD-2025), Pondicherry University
Sep 2025	*Optimization of reactive species generation in nonthermal atmospheric pressure Ar plasma using machine learning*, 9th Asia-Pacific Conference on Plasma Physics
May 2025	*Smart diagnostics of nonthermal atmospheric pressure plasmas for efficient reactor development*, IIT Mandi
Mar 2026	FDP: *Quantum superposition and entanglement in search and communication algorithms*, Sri Venkateswara University, Tirupati
Dec 2025	FDP: *Quantum playbook: From superpositions to entanglements and beyond*, Siddhartha Institute of Science and Technology, Puttur
Sep 2025	ATAL FDP: *Basics and applications of plasma physics*, Ashoka Women's Engineering College, Kurnool

FELLOWSHIPS AND HONOURS

2018	**Dean of Faculty Fellowship**, Weizmann Institute of Science, Israel
2014	**Visiting Researcher**, PROMES-CNRS, Perpignan, France
2010	**Commonwealth Exchange Program (Asia-Pacific) Research Grant**, DFAIT Canada, for collaboration with Prof. A. D. Stauffer, York University, Toronto
July, 2007	**CSIR-NET Junior and Senior Research Fellowships** (Physical Sciences)

MEMBERSHIPS

- Life Member, Indian Society of Atomic and Molecular Physics (ISAMP), No. 1371
- Life Member, Indian Physics Association (IPA), No. ROO/LM/12792
- Life Member, Plasma Science Society of India (PSSI), No. LM 906
- Life Member, Power Beam Society of India (PBSI), No. 105
- Life Member, Division of Plasma Physics, Association of Asia Pacific Physical Societies (AAPPS-DPP), No. 2997