



डॉ. अंजनी कुमार तिवारी

सहायक प्राध्यापक

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Academic qualification:

- **Doctor of Philosophy:** Tata Institute of Fundamental Research, Mumbai, India (July 2008 - January 2014)
- **Master of Science:** Department of Physics, C.C.S. University Meerut (2007) (Ist division)
- **Bachelor of Science:** (PCM Group), N.A.S. College Meerut (2005) (Ist division)
- **Intermediate:** K.K. Jain Inter College Khatauli, U.P. Board (2002) (Ist division)
- **High School:** H.K. Inter College Sakhoti, U.P. Board (2000) (Ist division)

Work experience:

- July 2022 - Present: Joint Faculty, Centre for Photonics and Quantum Communication Technology, Indian Institute of Technology Roorkee, India
- April 2021 - Present: Assistant Professor, Department of Physics, Indian Institute of Technology Roorkee, India
- May 2017 - April 2021: DST INSPIRE Faculty Fellow, Indian Institute of Technology Kanpur, India.
- May 2016 - April 2017: Senior Project Scientist, Indian Institute of Technology Kanpur, India.
- March 2014 - February 2016: Postdoctoral Research Fellow, European Laboratory for Non-Linear Spectroscopy (LENS), Italy.

Teaching engagements:

- Physics-1 (PHI-101), Autumn 2023-24, BTech 1st year, IIT Roorkee.
- Electromagnetic Theory (PHN-008), Spring 2022-23, BTech 1st year, IIT Roorkee (Student feedback 4.52/5).
- Mechanics (PHN-001), Autumn 2022-23, BTech 1st year, IIT Roorkee (Student feedback 4.53/5).
- Electromagnetic Theory (PHN-008), Spring 2021-22, BTech 1st year, IIT Roorkee (Student feedback 4.32/5).
- Mechanics (PHN-001), Autumn 2021-22, BTech 1st year, IIT Roorkee (Student feedback 4.62/5).
- Laboratory Work (PH-502), Spring-2022-23, MSc Physics 1st year, IIT Roorkee.
- Physics Laboratory (PH-106), Spring 2021-22, B. Tech 1st year, IIT Roorkee.
- Laboratory Work in Photonics (PHN-711), Autumn 2021-22, and 2022-23, MTech Photonics 1st year, IIT Roorkee.
- UG Lab (PHY 101L), 2nd Semester, 2018-19, and 2019-20 IIT Kanpur.
- Optics Lab (PHY 224L), 1st Semester, 2018-19 IIT Kanpur.

Administrative positions:

- Coordinator, B.Tech. in Engineering Physics-2022 batch, Department of Physics, IIT Roorkee (01 Aug 2022 - 31 Jul 2026)
- Member, Departmental Research Committee in IIT Roorkee, (10 Nov 2022 - 31 Oct 2024)
- Center's Research Committee Member, Center for Photonics and Quantum Communication Technology, IIT Roorkee, (16 Sept 2022 - 15 Sept 2024)
- Member, Departmental Purchase Committee in IIT Roorkee, (01 Aug 2022 - 31 Jul 2023)
- Professor-in-charge, Laser Physics laboratory in Department of Physics, IIT Roorkee (27 July 2022 - Present)
- Treasurer, Indian Physics Association, Roorkee Chapter (26 May 2022 - Present)
- Department Web Management Committee Member, Department of Physics, IIT Roorkee (13 Jul 2021 - 30 Jun 2022)

Fellowships and awards:

- **INSA Medal for Young Scientists** 2019.
- **Excellence in Oral Presentation** award at Photonics 2018.
- **INSPIRE Faculty Award** from Department of Science & Technology, India (July 2016).
- **1st Prize by OSA** for Best Student Paper Award at Photonics 2012.
- **Best Poster Presentation Award** by the Indian Laser Association at National Laser Symposium NLS-20 (2012).
- **TIFR Scholarship 2008:** Selected by the test and interview to receive research scholarship to attend graduate school at TIFR.
- **CSIR-NET-June 2007** and **UGC-NET-December 2007** Selected for junior research fellowship.
- **GATE-2006** and **GATE-2007** Qualified.
- **Secured 3rd** position in graduation at college (2005).

Short term visits:

- Visited TIFR from 21st May to 05th June 2019.

Scientific reviewer:

- **Nature Research:** Nature Communications.
- **Optical Society of America:** Optics Letters, Optics Express.
- **Springer:** Applied Physics B: Lasers and Optics.
- **IOP Science:** Journal of Optics, Journal of Physics Communications.
- **Taylor & Francis:** Journal of Modern Optics.
- **World Scientific:** International journal of Modern Physics B.
- Various National and International conference proceedings and research proposals.

Member societies:

- OPTICA (2011 onward).
- Optics Society of India (Life Member).
- Indian Laser Association (Life Member).
- Indian Physics Association (Life Member).

Research interests:

- Parity-Time Symmetric optical systems, Quantum optics, Photonic crystals, Topological photonics, metamaterial absorber, plasmonics and mesoscopic phenomena like Anderson localization.
- Light amplification in disordered amplifying structures, lasing in liquid crystal elastic materials and nanostructured thin film metamaterials.
- Study of light interaction with microstructures using analysis tools like Transfer Matrix method, Finite Difference Time Domain method, Monte Carlo simulation, and COMSOL, etc.
- Near field studies of passive and active nanostructured materials using Near Field Scanning Optical Microscope.

Research projects:

- **Experimental investigations of Transport and Modal Properties in non-Hermitian coupled Photonic Systems**, Scheme for Transformational and Advanced Research in Sciences, Ministry of Human Resource Development (MHRD), 2023-2026, 49.5 lakh, (sole PI).
- **Liquid crystal elastomer-based opto-mechanical control of photonic resonators**, Start-up Research Grant, Science and Engineering Research Board (SERB), 2022-2024, 30 lakh, (sole PI).
- **Optical properties of light-driven smart microstructures**, Faculty Initiation Grant, IIT Roorkee, 2022-2024, 20 lakh, (sole PI).
- **Light amplification and lasing in plasmonic nanostructured thin film metamaterials**, DST Inspire Faculty Award, Department of Science and Technology, 2017-2022, 35 lakh, (sole PI).

List of articles in refereed journals:

- [1] Nitish Kumar Gupta, Sapireddy Srinivasu, Mukesh Kumar, Anjani Kumar Tiwari, Sudipta Sarkar Pal, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Realization of Jackiw-Rebbi Zero-Energy Modes at Photonic Crystal Domain Walls: Emergence of Polarization-Indiscriminate Surface States," (Under Review, 2023).
- [2] Nikita Choudhary, and Anjani Kumar Tiwari, "Numerical investigation of wide-angle switchable and tunable refractive index-based metamaterial absorber," (Under Review, 2023).
- [3] Nitish Kumar Gupta, Sapireddy Srinivasu, Mukesh Kumar, Anjani Kumar Tiwari, Sudipta Sarkar Pal, Harshawardhan Wanare and S. Anantha Ramakrishna, "Direct Determination of Photonic Stopband Topological Character: A Framework based on Dispersion Measurements," (Under Review, 2023).
- [4] Nitish Kumar Gupta, Pradeep Chakravarthy, Mukesh Kumar, Anjani Kumar Tiwari, Sudipta Sarkar Pal, Kumar Vaibhav Srivastava, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Complementary quarter-wave retardance device for generating one or more polarization states," **Indian patent**, Application Number 202311056800, (2023).
- [5] Nitish Kumar Gupta, Aditi Chopra, Mukesh Kumar, Anjani Kumar Tiwari, Sudipta Sarkar Pal, Harshawardhan Wanare and S. Anantha Ramakrishna, "Surface State Engineering Using Bulk-Band Geometric Phases: Band Inversion and its Observable Implications in One-Dimensional Photonic Crystals" **Indian Journal of Pure and Applied Physics**: Special issue on "Recent Trends in Nanophotonics" Vol. 61, no. 7, pp. 560-567 (2023).
- [6] Nitish Kumar Gupta, Mukesh Kumar, Anjani Kumar Tiwari, Sudipta Sarkar Pal, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Spectroscopic Ellipsometry-based Investigations into the Scattering Characteristics of Topologically Distinct Photonic Stopbands," **Applied Physics Letters**, Vol. 121, Issue 26, pp. 261103 (2022).
Chosen as a **Featured Article in APL**
- [7] Nitish Kumar Gupta, Sapireddy Srinivasu, Anjani Kumar Tiwari, Harshawardhan Wanare and S. Anantha Ramakrishna, "Realizing Quasi-monochromatic Switchable Thermal Emission from Electro-Optically induced Topological Phase Transitions," **Scientific Reports**, Vol.12, pp. 7400 (2022).
- [8] Nitish Kumar Gupta, Anjani Kumar Tiwari, Harshawardhan Wanare and S. Anantha Ramakrishna, "Near singular-phase optical biosensing with strongly coupled modes of a plasmonic-photonic trimer," **Journal of Optics**, Vol. 23, no. 6, pp. 065003 (2021).
- [9] Rajesh Kumar, Anjani Kumar Tiwari, and S. Anantha Ramakrishna, "Surface plasmon coupling for selectively enhanced random lasing in periodically patterned silver columnar thin film metamaterials," **Applied Physics Letters**, Vol. 116, Issue 24, pp. 241902 (2020).
- [10] Alice Boschetti, Andrea Taschin, Paolo Bartolini, Anjani Kumar Tiwari, Lorenzo Pattelli, Renato Torre, and Diederik Wiersma, "Spectral super-resolution spectroscopy using a random laser," **Nature Photonics**, Vol. 14, Issue 3, pp. 177-182 (2020).
Earned the March 2020 cover of Nature Photonics.
- [11] Saleem Shaik, Anjani Kumar Tiwari, and S. Anantha Ramakrishna, "Refractive index sensor based on goldcoated nanoporous anodic alumina membranes to discriminate alcohol mixtures," **Pramana-Journal of Physics**, Vol. 93, Issue 2, pp. 30 (2019).
- [12] Anjani Kumar Tiwari, Lorenzo Pattelli, Renato Torre and Diederik S. Wiersma, "Remote control of liquid crystal elastomer random laser using external stimuli," **Applied Physics Letters**, Vol. 113, Issue 1, pp. 013701 (2018).
Chosen as a **Featured Article in APL** and also appeared in the **Scilight** which highlights the most interesting research published in AIP journals.
- [13] Anjani Kumar Tiwari, Saleem Shaik and S. Anantha Ramakrishna, "Lasing in dye-infiltrated nanoporous anodic alumina membranes," **Applied Physics B**, Vol. 124, Issue 7, pp. 127 (2018).
- [14] Anjani Kumar Tiwari, Ismail Mekaaoui-Alaoui, Sriram Guddala, and S. Anantha Ramakrishna, "Enhanced visualization of latent fingerprints on rough aluminum surfaces using sequential Au and Zn/ ZnS/ ZnO depositions," **Journal of Forensic Sciences**, Vol. 63, Issue 4, pp. 1275-1281 (2017).
- [15] Anjani Kumar Tiwari, K. Shadak Alee, Ravitej Uppu, and Sushil Mujumdar, "Single-mode, quasi-stable coherent random lasing in an amplifying periodic-on-average random system," **Applied Physics Letters**, Vol. 104, Issue 13, pp. 131112 (2014).
- [16] Anjani Kumar Tiwari and Sushil Mujumdar, "Random lasing over gap states from a quasi-one-dimensional amplifying periodic-on-average random superlattice," **Physical Review Letters**, Vol. 111, Issue 23, 233903 (2013).
- [17] Anjani Kumar Tiwari, Ravitej Uppu, and Sushil Mujumdar, "Experimental demonstration of small-angle bending in an active direct-coupled chain of spherical microcavities," **Applied Physics Letters**, Vol. 103, Issue 17, pp. 171108 (2013).

- [18] Rajesh V. Nair, Anjani K. Tiwari, Sushil Mujumdar, B. N. Jagatap, "Inhibition and enhancement of spontaneous emission using photonic band gap structures," **Advanced Materials Letters**, Vol. 4, Issue 6, pp. 497-501 (2013).
- [19] Anjani Kumar Tiwari, Ravitej Uppu, Sushil Mujumdar, "Frequency behavior of coherent random lasing in diffusive resonant media," **Photonics and Nanostructures - Fundamentals and Applications**, Vol. 10, Issue 4, pp. 416-422 (2012).
- [20] Anjani Kumar Tiwari, Balu Chandra, Ravitej Uppu, and Sushil Mujumdar, "Collective lasing from a linear array of dielectric microspheres with gain," **Optics Express**, Vol. 20, Issue 6, pp. 6598-6603 (2012).
- [21] Anjani Kumar Tiwari, Ravitej Uppu, and Sushil Mujumdar, "Aerosol-based coherent random laser," **Optics Letters**, Vol. 37, Issue 6, pp. 1053-1055 (2012).
- [22] Ravitej Uppu, Anjani Kumar Tiwari, and Sushil Mujumdar, "Identification of statistical regimes and crossovers in coherent random laser emission," **Optics Letters**, Vol. 7, Issue 4, pp. 662-664 (2012).
- [23] Rajesh V. Nair, Anjani K. Tiwari, Sushil Mujumdar, and B. N. Jagatap, "Photonic-band-edge-induced lasing in self-assembled dye-activated photonic crystals," **Physical Review A**, Vol. 85, Issue 2, 023844 (2012).
 Appeared in **Optics and Photonics news** (May 2012).
 Highlighted in **Nature India** (March 2012).

International conference proceedings:

- [1] Nikita Choudhary, and Anjani Kumar Tiwari, "Numerical Investigation of Dual-Band Metamaterial Absorber," Photonics 2023, IISc Bangalore (Contributory Talk) (05 - 08 July 2023).
- [2] Nitish Kumar Gupta, Anjani Kumar Tiwari, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Polarization speckle generation & control of angular memory effect in optically anisotropic media," **ISBN: 978-1-957171-05-0, Paper JW3B-89**, CLEO, San Jose, California, USA (15 - 20 May 2022).
- [3] N. K. Gupta, H. Wanare, A. Chopra, M. Kumar, S. S. Pal, A. K. Tiwari, and S. A. Ramakrishna, "Topological Surface State by Hierarchical Concatenation of Photonic Stopbands," **DOI: 10.1109/WRAP54064.2022.9758314**, IEEE WRAP 2022, IIT Mumbai (Contributory Talk) (04 - 06 March 2022).
- [4] Anjani Kumar Tiwari, Vivek Kumar Singh, and S. Anantha Ramakrishna, "Light-driven graphene-based multifunctional actuator," **ISBN: 978-1-943580-91-0, Paper SW2F.5**, CLEO, San Jose, California, USA (Contributory Talk) (09 - 14 May 2021).
- [5] Anjani Kumar Tiwari, Rajesh Kumar, and S. Anantha Ramakrishna, "Surface plasmon resonance mediated random lasing in thin film metamaterials," **ISSN: 978-1-943580-84-2**, OSA Laser Congress, Washington, D.C. United States (13 - 16 Oct. 2020).
- [6] Nitish Kumar Gupta, Anjani Kumar Tiwari, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Unidirectional narrowband perfect absorption in quasi-random structures - interplay of gap states and Tamm plasmon modes," **DOI: 10.1109/IPC47351.2020.9252319**, IEEE Photonics Conference, Vancouver, Canada (Contributory Talk) (28 Sept. - 01 Oct. 2020).
- [7] Anjani Kumar Tiwari, Rabisankar Samanta, S. Ajmal, and Sushil Mujumdar, "Random lasing from amplifying electrostatic spray of charged microjets," **DOI: 10.1109/WRAP47485.2019.9013680**, IEEE WRAP 2019, IIT Guwahati (13 - 14 Dec. 2019).
- [8] Rajesh Kumar, Anjani Kumar Tiwari, and S. Anantha Ramakrishna, "Lasing based on periodically patterned anisotropic thin film metamaterial," **DOI: 10.1109/WRAP47485.2019.9013730**, IEEE WRAP 2019, IIT Guwahati (13 - 14 Dec. 2019).
- [9] Saleem Shaik, Anjani Kumar Tiwari and S. Anantha Ramakrishna, "Enhanced lasing in metal-insulator-metal waveguide slab based on gold coated nanoporous anodic alumina membrane," **DOI: 10.1109/WRAP47485.2019.9013949**, IEEE WRAP 2019, IIT Guwahati (13 - 14 Dec. 2019).
- [10] Anjani Kumar Tiwari, Deepak Biswal, and S. Anantha Ramakrishna, "Tunable metamaterial absorber based on liquid crystal elastomer," **Proceedings of Photonics-2018, ISBN: 978-93-88653-41-1**, International Conference on Fiber Optics and Photonics, IIT Delhi (Contributory talk) (12 - 15 Dec. 2018).
 Won the **Excellence in Oral Presentation award** at Photonics 2018.
- [11] Saleem Shaik, Anjani Kumar Tiwari, and S. Anantha Ramakrishna, "Nanoporous alumina as an optofluidic alcohol sensor," **Proceedings of Photonics-2018, ISBN: 978-93-88653-41-1**, International Conference on Fiber Optics and Photonics, IIT Delhi (12 - 15 Dec. 2018).
- [12] Anjani Kumar Tiwari, Saleem Shaik, and S. Anantha Ramakrishna, "Coherent emission in optically transparent nanoporous anodic alumina films," **DOI: 10.1109/WRAP.2017.8468586**, IEEE WRAP 2017, Mahindra École Centrale, Hyderabad, India (18 - 19 Dec. 2017).

- [13] Anjani Kumar Tiwari, Lorenzo Pattelli, Renato Torre, and Diederik Wiersma, "Remote control of liquid crystal elastomer random laser," **DOI: 10.1109/WRAP.2017.8468557**, IEEE WRAP 2017, Mahindra École Centrale, Hyderabad, India (18 - 19 Dec. 2017).
- [14] Sushil Mujumdar, Anjani K. Tiwari, K. Shadak Alee and Ravitej Uppu, "Amplifying periodic-on-average random systems: Route to Anderson-localization random lasers," **ISBN: 978-1-55752-882-7**, International Conference on Fiber Optics and Photonics, IIT Kharagpur, Paper M3D.2.
- [15] Sushil Mujumdar and Anjani Kumar Tiwari, "Collective resonances and lasing induced by photon localization in aperiodically arranged microresonators," **MRS Spring Meeting**, San Francisco, California, USA (21 - 25 April 2014).
- [16] Anjani Kumar Tiwari and Sushil Mujumdar, "Photon-localization induced random lasing from an amplifying periodic-on-average random system," **ISBN: 978-1-4799-0594-2**, CLEO/Europe, Munich, Germany (12 - 16 May 2013).
- [17] Anjani Kumar Tiwari, Girish Kulkarni and Sushil Mujumdar, "Resonant multilayers for frequency control of photon localization random lasers," **Nanometa-2013**, 4th International Topical meeting on Nanophotonics and Metamaterials.
- [18] Anjani Kumar Tiwari, Ravitej Uppu and Sushil Mujumdar, "Lasing from quasi-one-dimensional random lattice of multiple resonators," **International Conference on Fiber Optics and Photonics**, IIT Madras, Paper TPo. 14.
Won the first prize for the **Best Student Paper Award** by OSA.
- [19] Rajesh V. Nair, Anjani K. Tiwari, Sushil Mujumdar and B. N. Jagatap, "Signature of Band-Edge-Induced Lasing Observed in Self-assembled Photonic Crystals," **International Conference on Fiber Optics and Photonics**, IIT Madras, Paper W1A.3.
- [20] Ravitej Uppu, Anjani Kumar Tiwari and Sushil Mujumdar, "Coherent random lasing in diffusive resonant media," **AIP Conf. Proc., 1398**, 103-105 (2011).
- [21] Anjani Kumar Tiwari, Balu Chandra, Ravitej Uppu and Sushil Mujumdar, "Coherent Emission from a Disordered Array of Amplifying Scatterers," **3rd International Conference on Current Developments in Atomic, Molecular, Optical and Nano Physics**, University of Delhi, India (14 - 16 Dec. 2011).

National conference proceedings:

- [1] Nikita Choudhary, Mukul Jaiswal, and Anjani Kumar Tiwari, "Numerical simulation of refractive index-based tunable metamaterial absorber," XLV Symposium of OSI: **Conference on Optics, Photonics & Quantum Optics (COPaQ)** (10 - 13 Nov. 2022).
- [2] Mukul Jaiswal, Nikita Choudhary, and Anjani Kumar Tiwari, "Broadband metamaterial absorber based on TiN hollow cylinders," XLV Symposium of OSI: **Conference on Optics, Photonics & Quantum Optics (COPaQ)** (10 - 13 Nov. 2022).
- [3] Nitish Kumar Gupta, Mukesh Kumar, Anjani Kumar Tiwari, Sudipta Sarkar Pal, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Experimental Determination of Topological Order in Photonic Stopbands," XLV Symposium of OSI: **Conference on Optics, Photonics & Quantum Optics (COPaQ)** (10 - 13 Nov. 2022).
- [4] Nitish Kumar Gupta, Anjani Kumar Tiwari, Harshawardhan Wanare, and S. Anantha Ramakrishna, "Ultra-narrowband asymmetric perfect absorption in quasi-random planar structures," **Student Conference on Photonic and Quantum Technology (SCPQT)-2021** (24 - 26 Feb. 2021).
Nitish won the Best Poster Presentation Award for this work.
- [5] Anjani Kumar Tiwari, Saleem Shaik, and S. Anantha Ramakrishna, "Low-threshold, stable lasing in gold-coated nanoporous anodic alumina membranes," **OSI - International Symposium on Optics** (Contributory talk) (19 - 22 Sept. 2018).
- [6] Anjani Kumar Tiwari, Ismail Mekaaoui-Alaoui, Sriram Guddala, and S. Anantha Ramakrishna, "Development of latent fingerprints on aluminum surfaces," **OSI - International Symposium on Optics** (19 - 22 Sept. 2018).
- [7] Saleem Shaik, Anjani Kumar Tiwari, Anantha Ramakrishna, "Enhanced lasing emission in gold coated nanoporous anodic alumina waveguide slab," **Symposium on 30 Years of Photonic Crystals - The Indian Research Scenario**, IIT Kanpur (21 - 23 Sept. 2017).
- [8] Anjani Kumar Tiwari, Ravitej Uppu and Sushil Mujumdar, "Light localization in quasi-one-dimensional array of spherical resonators," **DAE-BRNS Nation Laser Symposium NLS21** (6 - 9 Feb. 2013).
- [9] Anjani Kumar Tiwari, Balu Chandra, Ravitej Uppu and Sushil Mujumdar, "Coherent random lasing from an array of amplifying aperiodic spherical scatterers," **DAE-BRNS Nation Laser Symposium**, Crystal Growth Center, Anna University, Chennai, India.
Won the **Best Poster Presentation Award** by ILA and the work also appeared in **Kiran, Bulletin of Indian Laser Association**, vol. 23, no. 1 (2012).
- [10] Ravitej Uppu, Anjani Kumar Tiwari and Sushil Mujumdar, "Statistical Fluctuations in Coherent Emission from Disordered Nanostructured Amplifying Materials," **XXXVI OSI Symposium on Frontiers in Optics and Photonics**, IIT Delhi (3 - 5 Dec. 2011).

- [11] Anjani Kumar Tiwari, Ravitej Uppu and Sushil Mujumdar, “Random Lasing from an Array of Microdroplets,” **XXXVI OSI Symposium on Frontiers in Optics and Photonics**, IIT Delhi, India (3 - 5 Dec. 2011).

Schools attended:

- [1] **Summer School on Waves and Disorder**, The Institute of Scientific Studies of Cargese, Corsica, France, (July 01 - 11, 2014).
[2] **SERC SCHOOL ON NANO OPTICS**, NIT Hamirpur, Himachal Pradesh, India, (September 13 - October 01, 2010).
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