

KANCHAN GEHLOT

Present Affiliation & Address

Assistant Professor
Department of Physics
University of Rajasthan
JLN Marg, Jaipur-302004, Rajasthan, India
e-mail, Skype address: gehlot.kanchan@gmail.com
Google Scholar Profile: <https://scholar.google.co.in/citations?user=2QUypxcAAAAJ>
ResearchGate Profile: https://www.researchgate.net/profile/Kanchan_Gehlot
Vidwan-ID : 559651

Education

Indian Institute of Technology Delhi, New Delhi, India

- **Ph.D.** in Physics **November, 2016**
Supervisor: Prof. Anurag Sharma, Department of Physics
Thesis Title: Semi-Analytical Approximate Methods for Modelling of Nanophotonic Waveguides and Devices
Related Course Work:
Fiber Optics Guided Wave Optical Components and Devices
Characterization of Materials Numerical Modelling and Computational Methods in Research
Computer Programming and its Application
- **Master of Science** in Physics, **August, 2009**
Master's Thesis Advisor: Dr. Sankalpa Ghosh
Thesis Title: Effect of Rotation on Dipolar Bose-Einstein Condensates
- **Jai Narain Vyas University, Jodhpur, Rajasthan, India**
Bachelor of Science **June, 2006**
Triple Major (Physics, Chemistry, and Mathematics) **Gold Medal**
Awarded **Gold Medal** for securing highest marks

Awards and Achievements

- **Best Paper Award:** International OSA Network of Students (IONS), Chennai, India, 2012
- **Best Poster Award:** XXXVI OSI Symposium on Frontiers in Optics and Photonics, New Delhi, India, 2011
- **President,** IIT Delhi Student Chapter of OSA (2011-2012), organized a number of seminars, quizzes, exhibitions, scientific tours and outreach activities
- Awarded **Junior and Senior Research Fellowship** by Council for Scientific and Industrial Research, India: 2009-2013
- **University Gold Medal, Sir Donald Field Gold Medal:** awarded by Jai Narain Vyas University Jodhpur, for securing the highest marks in B.Sc. and standing first in merit, 2006

Work Experience

Assistant Professor, Department of Physics, University of Rajasthan (December 2013-present)

- **UG/PG courses taught:** Optics, Mathematical Methods in Physics, Group Theory, Basic Computer Physics and Applications using Programming in C, Special Theory of Relativity, Laboratory courses on Programming in C, Numerical Methods and General Physics

Teaching Assistant, IIT Delhi (2010-2013)

- Conducted tutorial sessions and evaluated assignments for Numerical and Computational Methods in Research (PhD Course, 2012, with Prof. Anurag Sharma), Selected Topics in Quantum Mechanics (PG Course, 2011, with Prof. Ajoy Ghatak), Fields and Waves (UG Course, 2010, 2011).

Orientation, Refresher Courses and Other Courses

101st Orientation Programme: UGC-HRDC, University of Rajasthan, Jaipur, Rajasthan (4 week course sponsored by UGC). Awarded Grade A. **04/07/2016 -30/07/2016**

GIAN Course on Si Photonics, Linear, Nonlinear, and Quantum Integrated Optical Devices and Circuits, IIT Madras, India **20/03/2017-01/04/2017**

Refresher Course-1: Nano Technology: UGC-HRDC, Saurashtra University, Rajkot, Gujarat (3 week course sponsored by UGC). Awarded Grade A **20/11/2017-10/12/2017**

Refresher Course-2: Physical Sciences & Nano Sciences: UGC-HRDC, Jawaharlal Nehru University, New Delhi (2 week course). Awarded Grade A. **18/11/2019-30/11/2019**

Refresher Course-3: Physical Sciences (All Physical Science Disciplines): UGC-HRDC, Panjab University, Chandigarh. Grade A **15/02/2022-28/02/2022**

NEP Orientation & Sensitisation Programme (online): UGC-Malviya Mission-Teacher Training Centre, University of Rajasthan, Jaipur **March 04-16, 2024**

Other Experiences

Student Trainee, School of Engineering and Mathematical Sciences, City University London, UK.

- **Advisor:** Prof. Azizur Rahman **June-July, 2011**
- **Summary of work:** Optimization of silicon slot waveguide structure for maximum power confinement in the low-index air/silica slot region using full-vector finite element method.

Research Interests

Computational Nano- and Bio-photonics: Development of approximate/numerical methods and techniques; Modelling of optical phenomena; Study of propagation, scattering and modal problems in photonics; Monte-Carlo methods, Characterization and optimization of various functional devices and optical components for optical communication and photonic integrated circuits; development of devices for application in sensing, communication and medical diagnostics.

Technical Skills

- **Operating Systems:** Windows, Linux, Solaris
- **Programming Languages:** Proficiency in BASIC, FORTRAN, C, MATLAB
- **Software tools:** COMSOL, RSoft, Lumerical, Mathematica, Origin, LaTeX
- **Numerical Techniques:** worked with following methods/techniques:
Monte Carlo Methods for light propagation, Finite Difference Time Domain (FDTD) method, Finite Element Method (FEM), Finite difference methods, Beam Propagation, Collocation method, Method of plane wave expansion for evaluation of photonic bandgap, Curve fitting, Numerical integration, Fast Fourier Transform (FFT), various finite difference methods for solving ordinary and partial differential equations.

Membership of Professional Bodies

- OSA, The Optical Society, 2010-present
- Optical Society of India, (OSI), 2011-present

Conferences and Seminars Organized

Convener, One day Seminar on Optics and Photonics, IIT Delhi, January 7, 2012.

Convener, International OSA Network of Student (IONS) Conference Delhi, December 1-2, 2011.

Publications in Refereed International Journals

1. K. Gehlot and A. Sharma, "Semi-vector iterative method for modes of high-index-contrast nanoscale waveguides", *Optics Express*, Vol. 21, No. 8, pp 9807-9812 (2013). <https://dx.doi.org/10.1364/OE.21.009807>
2. K. Gehlot, A. Sharma, "Approximate analysis of planar photonic bandgap waveguides: a simple semi-analytical method", *Optical and Quantum Electronics*, Vol. 46, Issue 3, pp 455-464 (2014). <http://dx.doi.org/10.1007/s11082-014-9873-7>
3. K. Gehlot and A. Sharma, "Optimization of Si slot waveguide using approximate semi-analytical method", *Optics Express*, Vol. 24, No. 5, pp 4722-4729 (2016). <https://dx.doi.org/10.1364/OE.24.004722>
4. K. Gehlot and A. Sharma, "Efficient modal analysis of surface plasmon polariton waveguides using approximate semi-analytical method," *Optical and Quantum Electronics*, Vol. 48, Article 341 (2016). <http://dx.doi.org/10.1007/s11082-016-0584-0>
5. K Joshi, BL Meena, K Gehlot, "Performance of silicon-on-insulator and silicon-on-sapphire based evanescent field gas sensor operating at 2.86 μm ," *AIP Conference Proceedings* 2768, 020023 (2023). <https://doi.org/10.1063/5.0148986>
6. M Mangal, BL Meena, K Gehlot, "Tailoring the dispersion profile of asymmetric As_2Se_3 horizontal slot waveguide for supercontinuum generation in the mid-IR region of spectrum." *AIP Conference Proceedings* 2768, 020021 (2023). <https://doi.org/10.1063/5.0148984>
7. BL Meena, K Gehlot, P Meena, K Meena, A Pradhan, K Panday, "Ex-vivo study for detection of cervical cancer at an early stage using polarized fluorescence spectroscopy," *AIP Conference Proceedings* 2768, 020022 (2023). <https://doi.org/10.1063/5.0149084>

Conferences/Workshops/Symposia

1. K. Gehlot, S. Ghosh, “Nucleation of vortex and formation of vortex lattice in rotating Bose-Einstein condensates of cold atoms”, Open House, IIT Delhi, New Delhi, April 18, 2009. (No proceedings)
2. P. Bindal, [K. Gehlot](#) and A. Sharma, “Effective index approximation for photonic crystal slabs: modelling of out of plan losses”, PHOTONICS-2010: *International Conference on Fiber Optics and Photonics*, Guwahati (India), December 11-15, 2010, Conference Proceedings, ISBN: 978-81-309-1719-1, pp-451.
3. [K. Gehlot](#), A. Sharma, “Analysis of 2D photonic crystal Waveguides using a simple analytical method”, IONS-Delhi, *the International OSA Network of Students Conference*, Delhi (India), December 1-2, 2011. (No Proceedings)
4. [K. Gehlot](#), D. M. H. Leung, A. Agrawal, and B. M. A. Rahman, “Optimization of power confinement in silicon slot waveguide”, *XXXVI OSI Symposium on Frontiers in Optics and Photonics* (FOP11), Delhi (India), December 3-5, 2011, ISBN: 978-81-309-1964-5, pp-254.
5. [K. Gehlot](#) and A. Sharma, “Analysis of 2D photonic bandgap waveguides using a simple analytical method”, *20th International Workshop on Optical Waveguide Theory and Numerical Modelling* (OWTNM-2012), Barcelona, Spain, April 20-21, 2012, ISBN: 978-0-9541146-4-0, pp-30
6. K. Gehlot and A. Sharma, “Analysis of 2D photonic bandgap waveguides using a simple analytical method”, PHOTONICS-2012: *International Conference on Fiber Optics and Photonics*, Chennai (India), December 9-12, 2012, ISBN: 978-1-55752-959-6, pp.1-3.
7. [K. Gehlot](#) and A. Sharma, “Semi-vectorial optimal variational method to analyze silicon strip nanoscale waveguides”, *IONS-Asia-2, the International OSA Network of Students Conference*, Chennai (India), December 7-8, 2012 (No Proceedings).
8. K. Gehlot, A. Sharma, “Optimal variational method for vector modes of nanoscale silicon strip waveguides”, *XXXVII National Symposium of Optical Society of India*, Puducherry (India), January 23-25, 2013 (No proceedings)
9. [K. Gehlot](#) and A. Sharma, “Simple analytical approach to optimize structure parameters of photonic crystal waveguide coupler”, *XXI International Workshop on Optical Waveguide Theory and Numerical Modelling* (OWTNM-2013), Enschede, The Netherlands, April 19-20, 2013, ISBN: 978-90-365-3538-0, pp. O-5.3.
10. [K. Gehlot](#) and A. Sharma, “Modified optimal variational method to study modal characteristics of Si photonic wire waveguides”, *XXI International Workshop on Optical Waveguide Theory and Numerical Modelling* (OWTNM-2013), Enschede, The Netherlands, April 19-20, 2013, ISBN: 978-90-365-3538-0, pp. P-02.
11. [K. Gehlot](#) and A. Sharma, “Modal Study of Silicon-Based Slot Waveguide using Approximate Semi-vector Analysis”, *Workshop on Recent Advances in Photonics* (WRAP 2013), IIT Delhi, New Delhi (India), December 17-18, 2013, ISBN: 978-1-4799-4864-2, pp 1-2.
12. K. Gehlot and A. Sharma, “Approximate Method for Modal Analysis of Nanoscale Surface Plasmon-Polariton Waveguides”, *XXII International Workshop on Optical Wave & Waveguide Theory and Numerical Modelling* (OWTNM 2014), Institut Fresnel, Nice, France, 27-28 June, 2014 (No proceedings)

13. [K. Gehlot](#) and A. Sharma, "Approximate analysis of Si slot waveguide dispersion characteristics", *PHOTONICS-2014: International Conference on Fibre Optics and Photonics*, Kharagpur, India, 13-16 December 2014, ISBN: 978-55752-882-7, pp- T3A.46.
14. Kanchan Gehlot and Anurag Sharma, "Approximate modal analysis of dielectric-loaded surface plasmon Polariton waveguides on metal strip of finite width," *XXIII International Workshop on Optical Waveguide Theory and Numerical Modelling (OWTNM-2015)*, City University London, England, 17-18 April, 2015 (No Proceedings)
15. A. Sharma and **K. Gehlot**, "Simple Semi-analytical Approximate Method for Analysis of Nanophotonic Optical Waveguides," in 13th International Conference on Fiber Optics and Photonics (**PHOTONICS-2016**), Kanpur, India, 4-8 December 2016, ISBN: 978-1-943580-22-4, paper W4D.1.
16. Kanchan Gehlot and Anurag Sharma, "Tailoring of the dispersion properties of asymmetric As_2Se_3 slot waveguide for mid-infrared supercontinuum generation using a semi-analytical approximate method", DAE-BRNS National Laser Symposium **NLS-28**, Vellore Institute of Technology, Chennai, Tamilnadu, January 8-11, 2020.
17. K. Gehlot and K. Joshi, "Modeling of a low-footprint trace gas sensor based on CMOS compatible SOI slot waveguide operating at 2.86 μm ," XLIV OSI Symposium: Frontiers in Optics and Photonics (FOP21), Indian Institute of Technology Delhi, New Delhi, September 24-27, 2021.
18. Karishma Joshi and Kanchan Gehlot, "Slot waveguide based evanescent field gas sensor: a promising sensing tool for mid-IR regime," 27th International Conference of International Academy of Physical Sciences (CONIAPS 2021) on Recent Advances in Applied Physics, NERIST, Itanagar, Arunachal Pradesh, India, October 26-28, 2021.
19. K. Joshi and K. Gehlot, "Design and analysis of silicon-on-sapphire based evanescent field sensor for detection of trace gases in mid-IR," 2nd International Conference on Renewable Energy (ICRE), Jaipur, India, University of Rajasthan Jaipur, India, February 25 – 27, 2022.
20. M Mangal, BL Meena, K Gehlot, "Tailoring the dispersion profile of asymmetric As_2Se_3 horizontal slot waveguide for supercontinuum generation in the mid-IR region of spectrum." International Conference on Computational Applied Science and its applications, University of Engineering and Management, April 28-29 2022.
21. K. Joshi, K. Gehlot, Bharat Lal Meena, "Performance of silicon-on-insulator and silicon-on-sapphire based evanescent field gas sensor operating at 2.86 μm ," Oral Presentation International Conference on Computational Applied Science and its applications, 2022, University of Engineering and Management, Jaipur-303807, Rajasthan, 28-29 April 2022. 28-29 April 2022.
22. M Mangal, BL Meena, K Gehlot, "Dispersion Tailoring of a Cross Slot Waveguide for Efficient Supercontinuum Generation" XLV International Workshop on Optics, Photonics & Quantum Optics (COPaQ-2022), Departments of Physics, and Centre for Photonics and Quantum Communication Technology, IIT Roorkee, India, November 10-13 , 2022.
23. K Joshi, M Mangal, BL Meena, K Gehlot, "Enhancement of Evanescent Field Ratio in a Slot Waveguide by Incorporating a Metal Layer in Substrate," XLV International Workshop on Optics, Photonics & Quantum Optics (COPaQ-2022), Departments of Physics, and Centre for Photonics and Quantum Communication Technology, IIT Roorkee, India, November 10-13 , 2022.