

Introduction

I am submitted Ph.D. thesis (Mode Engineering in Photonic Crystals and Evanescent Field Interferometer) to the Department of Photonics Science and Engineering at Indian Institute of Technology, Kanpur. I have research interest in the field photonics, quantum mechanics, optics, photonic bandgap materials, metamaterials.

Education Qualification

Degree	Year	Institution/ School	Performance
Ph.D. (Photonics Sciences and Engineering)	Pursuing	Indian Institute of Technology Kanpur, India	9.50/10
M. Sc (Honours School) Physics	2015	Guru Nanak Dev University, India	9.80/10
B. Sc (Honours School) Physics	2013	Guru Nanak Dev University, India	9.62/10
XII	2010	R B D A V Sr. Sec. Public School Bhatinda Punjab (CBSE)	82.8%
X	2008	Baba Farid Public School Faridkot Punjab (CBSE)	92.6%

Work Experience

Company	Department	Designation	Period
IIT Kanpur	Centre for Laser and Photonics	Teacher Assistant	Aug'16-June'21
Dashmesh Public School, Faridkot	Science (Physics)	Teacher	July'15- Feb'16

PhD thesis**[Supervisor: Prof. Harshawardhan Wanare, IITK]**

The work in my thesis is based on a robust control paradigm governing the superpositions of underlying states of Photonic Crystal (PC) cavity obtained by incorporating a weak localized perturbation. The perturbed PC cavity in multi-port optical systems is studied extensively for numerous photonic applications. Some of my research significances are as follow:

- Provided a simple yet effective analytical treatment to control spatial mode superposition for channelling light flow across photonic crystal.
- Validated the analytical treatment with numerical analysis using finite difference time domain technique.
- Demonstrated the aforementioned generic treatment to pin down a wave function of 2D quantum well.
- Proposed a variety of controllable optical elements for integrated optics applications.
- Proposed an Evanescent field interferometer in Mach-Zehnder geometry implemented in 2D PC structure.
- Provided a simplified quantum tunnelling model to mimic all the pertinent features of proposed interferometer.

Research Projects

- Chemical synthesis and characterization of cupric oxide nanoparticles (M.Sc Project) [Jan'15-May'15]
- Development and testing of high frequency B-Dot probes (Summer project: Institute for plasma research) [June'14-July'14]

Grants

MHRD-India grant for PhD

[2016-2022]

Relevant Course Work

Numerical Methods in Optics; Introduction to Photonics; Principle of Laser and Detectors; Quantum and Wave Phenomenon; Photonic Devices; Photonics System and Applications; Photonics Lab Techniques; Coherence and Quantum Entanglement

Positions of Responsibility

- Student head for designing broacher for RR Dasari Distinguished Lecture Series held in IIT Kanpur [Aug'16]
- Chief student co-ordinator for editing of proceedings for OSI-ISO conference held in IIT Kanpur [Sept'18]

Extra- Curricular

- Institute athletic player for high jump in Udgosh'18
- School representative in debate competition at district level [2006-07]

Technical Skills

MEEP (For FDTD simulations); MPB; Python; MATLAB; Origin; COMSOL; Latex; Optics alignment techniques

Hobbies

Reading I Running I Cooking I Travelling

Academics Achievement

- University second position holder in B.Sc. Honours School
- University second position holder in M.Sc. Honours School
- Third prize in Poster presentation in Summer School Program at Institute for Plasma Research
- Journal Article Published: 3
- Conference Proceedings:1

List of publications:

Journals:

1. Controlling spatial mode superposition to channel light flow in a photonic crystal, G Kaur, H Wanare, JOSA B 37 (12), 3809-3818
2. Breaking symmetry to steer light through multi-channel photonic crystal waveguides, G Kaur, H Wanare, Asian Journal of Physics 29 (5-7), 463-472
3. Engineering modes through metallic nanoparticle doping of waveguides, J Jose, G Kaur, Optics Communications 441, 80-83
4. Evanescent Field Mach-Zehnder Interferometer (Submitted)
5. Pinning down the wavefunctions through weak perturbation (under submission)

Conference proceedings:

1. Engineering spatial field distribution of modes in photonic crystal cavities, G Kaur, H Wanare, ICOL-2019 258 (Springer Proceedings in Physics), 857-860
2. Spatial mode engineering for integrated optics Mach-Zehnder interferometer (Advanced Photonics Congress-July 2022)

List of Referees

S.No	Name	Designation	Contact (Email id)
1	Harshawardhan Wanare	Professor, Department of Physics and Centre for Lasers and Photonics, IIT Kanpur, India	hwanare@iitk.ac.in
2	Shilpi Gupta	Assistant Professor, Department of Electrical Engineering, IIT Kanpur, India	shilpig@iitk.ac.in
3	Anand Kumar Jha	Assistant Professor, Department of Physics, IIT Kanpur, India	akjha@iitk.ac.in

English Proficiency test- IELTS (2021)

Listening	Writing	Reading	Speaking
9/9	7/9	9/9	7/9

Overall band score: 8/9