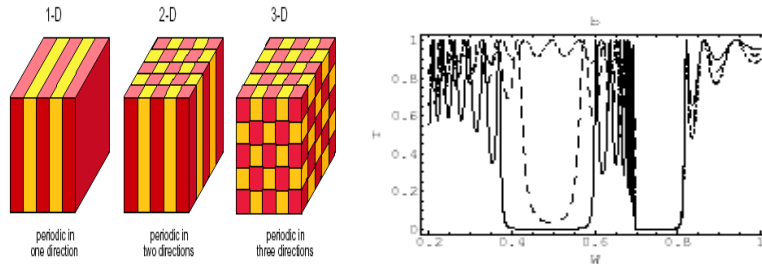


Optics, Photonics and Metamaterials



This research group focuses on theoretical investigations of optical properties of Photonic Crystals and Metamaterials. These are engineered composite structures that have emerged as promising research areas over the last three decades. Our particular interest is to study:

- ❖ Linear , nonlinear wave propagation and soliton formation in one dimensional photonic crystals and left handed metamaterials.
- ❖ Properties of Surface Plasmons –Polaritons in Hyperbolic metamaterials
- ❖ Imaging Properties of Photonic Hypercrystals
- ❖ Properties of Anisotropic and Chiral Metamaterials

□ Principal Investigator

Dr. Munazza Zulfiqar Ali

Associate Professor

□ PhD Students:

Hasnain Haider

Ariba Saleh (Co-supervision)

□ MPhil Students

□ Publications

MPhil Students

- **Maria Kiran**
- Wave propagation in left-handed metamaterials (M.Phil thesis 2007-2009)
- **Masood-ul-Hassan Farooq**
- Defect Modes in one-dimensional Photonic Crystals (M.Phil thesis 2008-2010)
- **Sajjad Ahmad**
- Surface Plasmons Polaritons in left-handed metamaterials (M.Phil thesis 2009-2011)
- **Hafiz Masood**
- Differential Detection of Faraday Rotation and Generation and Detection of Elliptically Polarized Light (Co-supervision) (B.Sc Hons.)
- **Amna Zahid**
- Nonlinear Properties of left-handed metamaterial (M.Phil thesis 2009-2011)
- **Maryam Saeed**
- Optical Tamm States at interfaces of Left-handed metamaterials (M.Phil thesis 2010-2012)
- **Zunera Akhtar**
- Nonlinear surface plasmons in left handed metamaterials (M.Phil thesis 2010-2012)
- **Misbah Batool**
- Optical Bistability in one dimensional photonic Crystals (M.Phil thesis 2011-2013)
- **Khadija Karim**
- Plasmon Polariton in Hyperbolic metamaterials. (M.Phil thesis 2011-2013)
- **Adeel Akram**
- Negative refraction in metamaterials (M.Phil (2013-15)
- **Zobia Afzal**
- Surface Plasmons in Hyperbolic Metamaterials (M.Phil 2013-15)
- **Hasnain Haider**
- Wave Propagation in Photonic HyperCrystals. (M.Phil 2014-16)
- **Akmal Iqbal**
- The Transmission line model for one dimensional periodic structures

Publications

- Investigation of nonlinear wave propagation in multilayered structures containing left-handed layers-a delta-function approach.
- Munazza Zulfiqar Ali, Ali, Tariq Abdullah, Phys. Lett. A 351 (2006) 184-191
- 2. Investigation of the linear and nonlinear properties of a Drude Model Photonic Crystal
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- 3. Properties of the angular gap in a one dimensional photonic crystal containing single negative material layers.
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- 4. Nonlinear localization due to a left-handed layer in a one-dimensional photonic crystal containing single negative material layers.
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- 5. Optical bistability at angular incidence in a one dimensional photonic band gap structure containing single negative material.
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- 6. Photonic gaps in one-dimensional PBG structures containing left-handed materials
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- 7. Properties of angular gap in one dimensional periodic structure containing left-handed metamaterials
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- 9. Unconventional Photonic Gaps of a one dimensional photonic band gap structure
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- 10. Properties of single and multiple defect modes in one dimensional photonic crystals containing lefthanded
- Munazza Zulfiqar Ali , Chin. Opt. Lett. 10, (2012), 071604
- 11. Effective medium parameters for 1D photonic crystals containing single negative materials using the envelope function approach,
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- 12. Optical Tamm states at interfaces of different periodic media containing single and double negative material layers
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- 16. Arbitrary amplitude electrostatic waves propagation in a magnetized dense plasma containing helium ions and degenerate electrons.
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- 17. *Nonlinear Surface waves in Photonic hypercrystals,*
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- 18. *Dispersion relations and wave propagation in photonic hypercrystals.*
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