

# Hrishikesh Kelkar

Graduate Student

1020 E 45th Street Apt 163

Austin Texas 78751 USA

☎ +1 512 471 0883

✉ [hrishi@physics.utexas.edu](mailto:hrishi@physics.utexas.edu)

## Education

- 2002–present **PhD**, *The University of Texas at Austin*, Austin, Texas.  
USA
- 2002 **MSc**, *Indian Institute of Technology*, Bombay.  
India
- 2000 **BSc**, *St. Xavier's College*, Bombay.  
India

## Masters Thesis

- Title *Optical Limiting by Fullerenes*
- Supervisor Dr. T. Kundu
- Description The project consisted of studying the nonlinear absorption of intense laser pulses by a fullerene doped glass sample.

## Research Experience

- 2002–present **Doctoral Research**, *supervisor: Dr. Mark Raizen*, The University of Texas at Austin.
- Setup an experiment to create a Bose Einstein Condensate of sodium atoms: Constructed analog and digital output cards which can be controlled with the existing National Instruments bus system. Constructed Direct Digital synthesizers (DDS) which can output RF frequencies up to 130 MHz. The frequency and amplitude of these DDS can be controlled in an arbitrary way in real time during the experimental sequence. Designed and constructed PID servo loops which are used to control current in a magnetic field coil, power of a laser beam and frequency lock the laser.
  - Designed an optics setup to create an optical lattice whose lattice spacing can be changed in real time by over an order of magnitude in a stable manner.
  - Setup an experiment to create Fock states of atoms: The setup includes design and construction of a Gaussian beam mode converter that takes a Gaussian TEM<sub>00</sub> beam and converts it to a Hermite-Gaussian TEM<sub>01</sub> beam using holographic technique. Setup a single atom fluorescence detection system. A number of innovative ideas were tried to transport a Bose Einstein Condensate over a distance of 25 cm, including, the use of a corner cube retro-reflector to make the laser beam less sensitive to vibrations.

- 2000–2002 **Masters Research**, *Indian Institute of Technology*, Bombay, India.
- Designed and constructed a high voltage pulse generator (based on Marx generator) to drive a Pockel's cell for Q-switching a laser.
  - Setting up a frequency doubler for a pulsed Nd:YAG laser system.
- 1998–2000 **Undergraduate Research**, *St. Xavier's College*, Bombay, India.
- Recorded and analyzed Cyanogen and Iodine spectra to identify the different emission lines.
  - Designed a QUIC trap for a Bose Einstein Condensation experiment (supervisor: Dr. Vasant Natarajan, Indian Institute of Science, Bangalore).
  - Successfully setup an experiment to study Electromagnetically Induced Transparency (EIT) in a Rubidium vapor cell (supervisor: Dr. Vasant Natarajan, Indian Institute of Science, Bangalore).

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## Teaching Experience

- 2002–2004 **Teaching Assistant**, *University of Texas*, Austin.
- The duties included conducting an undergraduate mechanics laboratory, setting up experiments, grading lab reports and helping students understand basic concepts in physics.

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## Awards and Scholarships

- 2002 **Institute Silver Medal**, *Indian Institute of Technology*, Bombay.
- 2002 **Prof. R. P. Singh Memorial Prize**, *Indian Institute of Technology*, Bombay.
- 2001 **Ram Ganesh Marathe Scholarship**, *Indian Institute of Technology*, Bombay.
- 2000 **Honours Degree**, *St. Xavier's College*, Bombay.

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## Refereed Publications

- 1 *Real-Time Control of the Periodicity of a Standing Wave: an Optical Accordion.*, T.C. Li, H. Kelkar, D. Medellin, M.G. Raizen. *Optics Express* **16** 5465 (2008).
- 2 *A Bose-Einstein Condensate Driven by a Kicked Rotor in a Finite Box.*, K.C. Henderson, H. Kelkar, T.C. Li, B. Gutierrez-Medina, and M.G. Raizen. *Europhys. Lett.* **75**, 392 (2006).
- 3 *Experimental Study of the Role of Atomic Interactions on Quantum Transport.*, K.C. Henderson, H. Kelkar, B. Gutierrez-Medina, T. Li, and M.G. Raizen. *Phys. Rev. Lett.* **96**, 150401 (2006).

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## Conference Publications

- 1 Hrishikesh Kelkar, Kirsten Viering, Tongcang Li, David Medellin, and Mark Raizen, "*Towards the Creation of Fock States of Atoms*" presented at the International Conference on Cold Atoms (ICCA), 2008 organized by the Indian Institute of Science Education and Research (IISER), Kolkata, 12-16 December 2008
- 2 Hrishikesh Kelkar, Braulio Gutierrez Medina, Kevin Henderson, and Mark Raizen, "*Quantum Transport of a Bose Einstein Condensate*" presented at the 2005 annual meeting of the Division of Atomic, Molecular and Optical Physics (DAMOP) of the American Physical Society, Lincoln, Nebraska, 17-21 May 2005, paper:F4.00007

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## Computer skills

Experienced in Visual C++, Mathematica, Vectorworks (machine drawing) and Eagle (Electronic circuit design).

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## Professional Societies

Member, American Physical Society

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## Personal Information

Born	Kalyan, India on December 23 1979
Citizenship	India

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## References

Available upon request