

ANUPRIYA JAYAKUMAR
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PREVIOUS JOB QUALIFICATIONS

Instructor, Summer 2014
Introductory mechanics, University of Washington, Seattle, WA

EDUCATIONAL QUALIFICATIONS

Post-Doctoral Research Associate, 2012-2014
Prof. Boris Blinov
University of Washington, Seattle, WA

Ph.D. (Physics), 2007–2012
Prof. M. Pattabiraman
Indian Institute of Technology Madras, Chennai, India

M.S (Physics), 2005–2007
Presidency College (Madras University), Chennai, India

B.S (Physics), 2002–2005
Meenakshi College for Women (Madras University), Chennai, India

RECENT COURSES (Coursera):

- **The Data Scientist's Toolbox (Feb 2, 2015 - Feb 28, 2015):** Successfully completed the course with distinction.
- **Programming for Everybody-Python (Feb 2, 2015 – Apr 28, 2015):** Successfully completed the course with distinction.
- **Data Analysis and Statistical Inference (Mar 2, 2015 – May 10, 2015):** Successfully completed the course with distinction.
- **R Programming (May 4, 2015 – May 31, 2015):** Successfully completed the course with distinction.
- **Python for Genomic Data Science (Aug 3, 2015 – Aug 31, 2015):** Successfully completed the course with distinction.
- **Machine Learning (Feb 5, 2018 – April 22, 2018):** Successfully completed the course with distinction.

HIGHLIGHTS OF QUALIFICATIONS

- **Scientific techniques:** Extended cavity diode laser construction • Two-channel acousto optic modulator (AOM) driver box construction • A-B differential amplifier circuit design and construction • Precision spectroscopy • Saturated absorption spectroscopy • Ion trapping • Vacuum techniques (Ultra-high vacuum, UHV) • Optical alignment • Fiber optics coupling • Machining
- **Skills:** Data analysis, R, Matlab, Octave, MYSQL, Python, Mathematica, Igor, Origin, HTML basics and LaTeX

RESEARCH EXPERIENCE

2012–2014 **Department of Physics, University of Washington, Seattle, Washington, US**

- **Precision spectroscopy lab (Dr. Boris Blinov)**

Polarization rotation measurement of the $6S_{1/2} \leftrightarrow 5D_{3/2}$ magnetic dipole transition moment in Ba^+ .

The motivation behind this study is to make a precise measurement of $M1$, which is the leading source of systematic error in our planned parity nonconservation measurement. In our technique, the Rabi frequency was measured for the $6S_{1/2} \leftrightarrow 5D_{3/2}$ transition with $\Delta m = 0$ and $\Delta m = 2$ as a function of the linear polarization angle of the 2051 nm beam. By measuring the polarization dependence of the $\Delta m = 0$ transition Rabi frequency, the ratio of $M1$ to the much larger and well known electric quadrupole amplitude can be obtained, from which $M1$ can be extracted.

Study of stress induced birefringence

Studied the birefringence induced by the stress across fused silica viewports using crossed polarizers arrangement and characterized the corresponding optical axis orientation and the phase retardance associated with it using the Jones matrix formalism. The data was analyzed using Origin software.

- **Ultra-cold Atoms and Molecules (Dr. Subhadeep Gupta)**

Dual-axis Ytterbium (Yb) vapor cell for simultaneous laser frequency stabilization on disparate optical transitions.

Developed a dual-axis Ytterbium (Yb) vapor cell to simultaneously address the two laser cooling transitions in Yb at wavelengths 399 nm and 556 nm, featuring the disparate line-widths of $2\pi \times 29$ MHz and $2\pi \times 182$ KHz respectively, thereby enabling the simultaneous observation of saturated absorption spectroscopy for both these transitions and demonstrated stabilized laser frequency over a full day.

2007–2012 **Department of Physics, Indian Institute of Technology Madras, Chennai, India (Dr. M. Pattabiraman)**

Hanle electromagnetically Induced transparency and absorption resonances with a Laguerre Gaussian Beam

Studied the influence of the Laguerre Gaussian beam profile which has a spatially varying phase factor and mode amplitude on the atomic coherence and associated spectroscopic phenomenon like Hanle electromagnetically induced transparency and absorption (EIT)/ (EIA) resonances.

Ellipticity dependent polarization rotation studies with a Laguerre Gaussian beam

The influence of the Laguerre Gaussian beam profile on the higher order coherences were studied by carrying out the ellipticity dependent polarization rotation measurements.

Atomic and Optical Physics lab, Indian Institute of Science (IISc), Bangalore, India (Dr. Vasanth Natrajan):

NMOR (Nonlinear magneto-optical rotation) in paraffin coated Rubidium vapor cell with a Laguerre Gaussian beam (September – December 2010)

Resonant nonlinear magneto-optical rotation (NMOR) measurements were carried out using a cylindrical paraffin coated Rubidium vapor cell (Dimension: 8cm in diameter and 5cm long) with Laguerre Gaussian beam having orbital angular momentum of $l = +1, +2$ and $+3$, to study its influence on the NMOR-transit effect and narrow resonance.

Summer 2006 **Indira Gandhi Center for Atomic Research (IGCAR), Kalpakkam, India**

Characterization of GaAs Semiconductor

The main aim of the program was to acquaint us with the nuances of the experimental techniques involved in the synthesis, characterization and the analysis of the given material – GaAs semiconductor. Experiments such as powder X - ray diffraction, positron annihilation spectroscopy, Auger electron spectroscopy, secondary ion mass spectrometry and optical absorption spectroscopy was carried out on GaAs semiconductor.

HONORS AND AWARDS

- 2002-2005 Gold medalist, First rank in Department of Physics, B.S (Physics) at Meenakshi College for Women (Madras University), Chennai, India.
- 2005-2007 Gold medalist, First rank in Department of Physics, M.S (Physics) at Presidency College (Madras University), Chennai, India.
- 2007 Best poster presentation, IX annual two-day state level technical seminar in physical sciences, Feb 23-24, 2007 by the Department of Physics, Queen Mary's college and Indian Spectro-Physics Association (ISPA), Pachaiyappa's College, **"Electrodynamics of spinless and spin $\frac{1}{2}$ particles and the study of time dilation in Muon decay Process"**

SELECTED PUBLICATIONS

Spencer R. Williams, **Anupriya Jayakumar**, Matthew R. Hoffman, Boris B. Blinov, E.N. Fortson, "An Upper Bound on the Strongly Forbidden $6S_{1/2} \leftrightarrow 5D_{3/2}$ Magnetic Dipole Transition Moment in Ba^{+} ", **Asian Journal of Physics**, **26** 09-19 (2017).

Anupriya Jayakumar, Ben Plotkin-Swing, Alan Jamison and Subhadeep Gupta, "Dual-axis Vapor Cell for Simultaneous Laser Frequency Stabilization on Disparate Optical Transitions", **Review of scientific instruments**, **86**, 073115 (2015).

Spencer R. Williams, **Anupriya Jayakumar**, Matthew R. Hoffman, Boris B. Blinov and E. N. Fortson, "Method for measuring the $6S_{1/2} \leftrightarrow 5D_{3/2}$ magnetic-dipole-transition moment In Ba^{+} ", **Phys. Rev. A**, **88**, 012515 (2013).

Matthew R. Hoffman, Thomas W. Noel, Carolyn Auchter, **Anupriya Jayakumar**, Spencer R. Williams, Boris B. Blinov and E. N. Fortson, "Radio frequency spectroscopy measurement of the Landé g factor of the $5D_{5/2}$ state of Ba II with a single trapped ion", **Phys. Rev. A**, **88**, 025401 (2013)

J. Anupriya, Nibedita Ram and M. Pattabiraman, "Hanle electromagnetically Induced transparency and absorption resonances with a Laguerre Gaussian Beam", **Phys. Rev. A**, **81**, 043804 – 043806 (2010).

Nibedita Ram, **J. Anupriya**, M. Pattabiraman and C. Vijayan, "Role of transfer of coherence in enhanced absorption Hanle effect with two optical fields", **J. Phys. B: At. Mol. Opt. Phys**, **42**, 175504 – 175510 (2009).

CONFERENCES

15th Annual Meeting of the APS Northwest Section, University of Washington, Seattle, WA, **“Progress toward measuring the $6S_{1/2} \leftrightarrow 5D_{3/2}$ strongly forbidden Magnetic dipole transition moment in Ba⁺”** May 1-3, 2014.

44th Annual Division of Atomic Molecular and Optical Physics (DAMOP) meeting, Quebec city convention center, Quebec City, Quebec, Canada **“Proposal for parity nonconservation measurements in a single trapped Ba ion”** June 3-7, 2013

Third international conference on “Current Developments in Atomic, Molecular, Optics and Nano Physics”, University of Delhi, New Delhi, India **“Hanle electromagnetically Induced transparency and absorption resonances with a Laguerre Gaussian Beam.”** December 14-16, 2011

Tropical conference on Interaction of Electromagnetic Radiation with Atoms, Molecules And Clusters, Raja Ramanna Centre for Advanced Research (RRCAT), Indore, India **“Role of transfer of coherence in enhanced absorption Hanle effect with two optical fields.”** March 3-6, 2010

DAE-BRNS symposium on Atomic, Molecular and Optical Physics, Inter University Accelerator centre, New Delhi, India, **“Study of Laguerre Gaussian beam induced azimuthal Doppler shift using saturation absorption spectroscopy.”** February 10-13, 2009

OTHER INFORMATION

- Tutored classical mechanics, general physics and electronics labs in Indian Institute of Technology Madras, India for three years and mechanics labs, waves and optics labs for a year in University of Washington, Seattle.
- **Secretary 2011, SPIE student chapter**, Indian Institute of Technology Madras.