

PRADIP GATKINE

1248 Physical Sciences Complex, University of Maryland \diamond College Park MD

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RESEARCH INTERESTS

I enjoy studying astrophysics, especially the high redshift universe, gamma ray bursts, cosmology and intergalactic medium. I also design and build instruments to observe the high redshift universe.

EDUCATION

University of Maryland College Park

PhD in Astronomy

Expected in 2019

M.S. in Astronomy

Aug 2014 - Aug 2016

Thesis title: Development of on-chip Arrayed Waveguide Grating Spectrometer and Simulation of Fiber Bragg-gratings for Atmospheric OH-emission Suppression in Near-infrared H-band

Advisors: Prof. Sylvain Veilleux (Astronomy) and Prof Mario Dagenias(ECE)

GPA: 4.0/4.0

Indian Institute of Technology Bombay

2010-2014

B.Tech. in Mechanical Engineering (with Honors) and Minor in Physics

GPA: 8.8/10.0

AWARDS & ACHIEVEMENTS

- Dean's Fellowship (\$10,000) and Merit Fellowship (\$2000), awarded to outstanding incoming graduate students, University of Maryland (2014-15)
- Kulkarni Graduate Student Summer Research Fellowship (\$5000), Univ. of Maryland (2016)
- John Chi-Lin Wang Award for Academic Excellence (\$1000), for best overall performance in grades, second-year project and qualifying exam, Dept of Astronomy, University of Maryland (2016)
- Best Student Presentation award at SPIE Astronomical Telescopes + Instrumentation, (2016)
- Best Poster Award, Nanotechnology Day, University of Maryland (2016)
- Summer Research Fellowship, awarded by Indian Academy of Sciences (2013)
- Received prestigious Kishore Vaigyanik Protsahan Yojna (Young Scientist Incentive Fellowship) awarded by Dept. of Science and Technology, Govt. of India (2010)

RESEARCH EXPERIENCE

Probing the circumgalactic medium with Gamma-ray Burst afterglows Aug 2016 - Present
Dept of Astronomy, University of Maryland

- We are using an extensive sample of 154 GRB afterglow spectra to probe the circumgalactic material around the host galaxy by measuring the absorption features of metals
- Developed a Python-based pipeline for analyzing high- and low-resolution GRB afterglow absorption spectra and fitting multi-component Voigt profile to the metal-lines of interest (~ 40 lines).
- The pipeline measures equivalent widths of metal lines and evaluates the column density for each component of the lines using curve-of-growth method

Development of an Astrophotonic Spectrometer

Aug 2014 - Aug 2016

Dept of Astronomy and Dept of Electrical and Computer Engg, University of Maryland

- Designed, fabricated and characterized a photonic Arrayed Waveguide Grating spectrometer device for large astronomical telescopes to study high redshift GRB afterglows

- The AWG spectrometer device covers H-band in near-infrared (1450-1650 nm) with a moderate resolving power of 1500 and on-chip throughput of 65% with a chip size of 12mm x 6mm
- Devised and proved a new and crucial technique to build polarization-insensitive photonic AWG spectrometer (*invention disclosure pending*)

Atmospheric OH-suppression to aid the study of Intergalactic Medium (IGM) 2015 - 2016
Dept of Astronomy, University of Maryland

- Simulated the *Fiber Bragg-Grating* based filter device for ground-based telescopes to suppress the atmospheric OH-emission in near-infrared and evaluated its effectiveness in improving the detection of weak signals from high-redshift gamma ray bursts and the intervening intergalactic material
- Simulated the FBG filters for the upcoming Maryland OH-suppression IFU system (MOHSIS) instrument on Discovery Channel Telescope (DCT) with detailed instrument pipeline and estimated a *ten-fold improvement in the signal-to-noise ratio*

Near-Space balloon-based instrumentation for Cosmic-ray studies July 2013 - May 2014
Undergraduate Thesis, Advisors: Prof B. Sridhar, Prof P. Sarin, IIT Bombay

- Designed, developed and characterized a lightweight (50 gm) prototype payload for Cosmic Ray Flux measurement in the atmosphere using PIN diodes and fast-readout embedded circuitry
- Successfully launched the cosmic-ray flux measurement payload into near-space (40 km altitude) and relayed the real-time experimental data during the entire ascend and descend flight of four hours

Magnetohydrodynamic simulations in a spherical shell Winter 2011
National Initiative for Undergraduate Science, Advisor: Dr. Aniket Sule, TIFR, Mumbai

- Studied the Spectral Method based simulation of the temporal evolution of an astrophysical magnetohydrodynamic spherical shell with differential rotation
- Simulated formation of *Solar Tachocline* by varying initial conditions of relic magnetic field (toroidal & poloidal) and non-dimensional parameters (Magnetic Prandtl, Reynolds & Lundquist Numbers)

PUBLICATIONS/ CONFERENCE PROCEEDINGS

1. **P. Gatkine** et al. *Development of high-resolution arrayed waveguide grating spectrometers for astronomical applications: first results*, Proceedings of SPIE Volume 9912, article id 991271, 2016
2. T. Zhu, Y. Hu, **P Gatkine**, et al. *Arbitrary On-chip Optical Filter Using Complex Waveguide Bragg Gratings*, Applied Physics Letters 2016 108:10 (peer reviewed).
3. T. Zhu, Y. Hu, **P. Gatkine**, et al. *Ultrabroadband High Coupling Efficiency Fiber-to-Waveguide Coupler Using Si_3N_4/SiO_2 Waveguides on Silicon*, IEEE Photonics Journal, vol. 8, no. 5, 2016 (peer reviewed).
4. **P. Gatkine**, K. P. Ray, *New Method for Asteroid Shape Detection using Spherical Segmentation based Delay Doppler Analysis*, International Radar Symposium, India 2013

LEADERSHIP/OUTREACH EXPERIENCE

- Delivered two science popularization talks at College Park Academy for high school students (2016)
- Led a 10-member team of *Mars Society India, IIT Bombay* in the development of a prototype mars rover (on-board electronics and software) and field testing at *Arkaroola Mars Robot Challenge Expedition* in Australia (2014)
- Mentored a 4-member team for *NASA Space Settlement Design Contest* and was awarded Specialty Honorable Mention in Life Sciences category (2011)