

# Abhimat Krishna Gautam

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## Current Address

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23 Oak Grove Avenue  
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## EDUCATION

2014 - [In Progress]: University of California, Los Angeles

*Graduate*

Division of Astronomy & Astrophysics, Department of Physics & Astronomy

2010 - 2014: University of California, Berkeley

*Undergraduate*

Majors: Astrophysics (with Honors), Physics

2006 - 2010: Barrington High School, Barrington, RI

*High School*

## RESEARCH EXPERIENCE

### Search for Radio Transients in Kepler Field and Astropulse Candidates: Summer 2011–Now

I am working at Berkeley with Dr. Andrew Siemion on a search for fast radio transients. I have constructed an automated pipeline with the tools available in the PRESTO software package to conduct the search. I am working with radio observations of planet candidates discovered by the Kepler spacecraft thought to have properties conducive to the development of life, allowing a targeted search for SETI signals. Furthermore, these observations allow an opportunity to detect older millisecond and recycled pulsars located above the galactic plane. In addition, I am using this pipeline to analyze re-observations of candidates from the Astropulse survey. Through this project, I have gained experience in working with techniques to search for periodic and transient objects and developed an interest in learning about neutron stars and pulsars.

### Multi-Wavelength and Epoch Analysis of the Guitar Nebula/PSR B2224+65: Summer 2012

I worked with Dr. Shami Chatterjee and Dr. Jim Cordes at Cornell University to perform an analysis of the areas surrounding PSR B2224+65 across multiple epochs of observations. In optical, I worked with Hubble Space Telescope data to study the evolution of the bow shock nebula created by the pulsar, known as the Guitar Nebula. In X-ray, I searched for an evolution of the X-ray jet coincident with the pulsar's location using Chandra X-ray Observatory data. In radio, I used Very Long Baseline Array data to measure the pulsar's proper motion precisely and attempted to find its parallax motion to help determine its distance. This project was a part of Cornell University's Astronomy REU program.

### **Calibration of Sgr A\* VLBI Observations: Summer 2011–Spring 2012**

I worked closely with Dr. Melvyn Wright at Berkeley to calibrate millimeter VLBI observations of Sgr A\*. I used the tools in MIRIAD to perform the necessary calculations for the calibration. In addition, I created my own scripts that work with MIRIAD to generate required values and plots. Through the project, I gained valuable experience in interferometry and VLBI.

### **High Angular Resolution Imaging of Multiple Asteroids: Fall 2010–Spring 2011**

I worked at Berkeley with Dr. Franck Marchis on collecting, processing, analyzing, and organizing observations of multiple asteroid systems. These data were taken from telescopes such as the Keck Telescope and the Hubble Space Telescope. As part of the work, I learned more about collecting observations at optical wavelengths and working with these observations in IDL and PHP.

### **High School Senior Project: Fall 2009–Spring 2010**

For my senior project, I expanded on my SSP work (detailed below) with the help of a local amateur astronomer, Mr. Herbert Peterson. I performed observations of a few asteroids on the Minor Planet Center's critical list, which are difficult to observe due to faintness or fast speeds. We submitted the astrometric data to the Minor Planet Center. I then attempted calculating the orbit of the asteroids through a Python script I wrote. We also attempted to determine the rotational period of asteroids by collecting photometric data. However, this part of the project was unsuccessful since our equipment was not sensitive enough.

### **Summer Science Program (SSP): Summer 2009**

I carried out an orbit determination project in a small group of 3 students. The project involved performing multiple observations of a Near Earth Asteroid (Asteroid 138883 (2000 YL29)). Alongside this, I wrote a Python script that would attempt to calculate the orbit of the asteroid using the Gaussian method of orbit determination. As part of SSP, I got my first exposure to real scientific research outside the classroom, while also learning valuable physics, math, and astronomy concepts.

## **TALKS**

**SETI Searches for Radio Transients from Kepler Field Planets and Astropulse Candidates:**  
224<sup>th</sup> AAS Meeting, June 2014, Boston, MA, USA.

## **POSTERS**

**Multiple epoch analysis of the Guitar Nebula and PSR B2224+65 in Radio, Optical, and X-Ray wavelengths:** 221<sup>st</sup> AAS Meeting, January 2013, Long Beach, CA, USA.

**Constructing an Automated Pipeline for Pulsars and Periodic Signals:**  
CASPER Workshop 2011, October 2011, Pune, India.

## **COMPUTER SKILLS**

**Experienced:** Python, Java, IDL, Mathematica, Unix  
Software packages: PRESTO, REDSPEC

**Some experience:** MATLAB, PHP, MySQL  
Software packages: CIAO, AIPS, MIRIAD, IRAF

## **OUTREACH**

**Bay Area Science Festival, San Francisco, CA: November 2011, 2012, 2013**

I volunteered at the Berkeley SETI/CASPER booth, helping explain the SETI and SETI@Home projects, the Arecibo message, and exoplanets to the public.

**California Academy of Sciences NightLife, San Francisco, CA: October 2013, April 2013**

I volunteered at the Berkeley SETI booth, and helped detail the SETI@Home and other Berkeley SETI projects to the public.

**Cal Day, San Francisco, CA: April 2013**

I helped run hands-on demos and the inflatable planetarium for the Astronomy department's space at Cal Day.

**Sunday Streets, Berkeley, CA: October 2012**

I helped run physics demonstrations and answered 'Ask a Physicist' questions as part of the Compass booth at the Sunday Streets Berkeley event.

**Focus for Teens, Ithaca, NY: June 2012**

I volunteered at Cornell University to help teach stellar evolution to local high school students.

## **PERSONAL INTERESTS AND ACTIVITIES**

In my spare time, a few activities I enjoy include drawing, running, stargazing, and writing. I also like to write for a personal blog about astronomy. On the blog, I share my personal explorations in astronomy and write details about results from interesting research projects in astronomy. It is available at <http://astronomyandspace.net>.