

# SHREYAS PADHY

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## EDUCATION

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**Indian Institute of Technology, Delhi**

**May 2017 (expected)**

B.Tech in Engineering Physics

Overall GPA: 8.70/10

## RELEVANT COURSEWORK

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Classical Mechanics & Special Relativity<sup>1</sup>, Quantum Mechanics, Electrodynamics, Mathematical Physics, Optics, Semiconductor Devices<sup>1</sup>, Materials Synthesis, Signals and Systems<sup>1</sup>, Digital Electronics, Artificial Intelligence, Data Structures & Algorithms, Numerical Methods in Electromagnetics<sup>2</sup>

## RESEARCH INTERESTS

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Radio & Observational Astronomy, Cosmology & Astrophysics, Computational Electromagnetics

## RESEARCH PROJECTS

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**Adaptive Meshing Techniques in Microwave Imaging**

**May 2015 - Present**

*Under supervision of Dr. Uday Khankhoje, Dept. of Electrical Engineering, IIT Delhi*

- Working on adaptive meshing techniques to improve resolution and computational time for bio-medical microwave imaging of cancerous tumors.
- Implemented an inverse solver for microwave imaging using the Constraint Projection Method with block constraints and line backtracking search.
- Designed an adaptive mesh reconfiguration algorithm that uses a multilevel sampling algorithm based on filtered backpropagation predictions of the solution to the inverse problem.

**Stochastic Methods in Rough Surface Scattering**

**December 2014 - Present**

*Under supervision of Dr. Uday Khankhoje, Dept. of Electrical Engineering, IIT Delhi*

- Working on stochastic modelling of rough surfaces to improve speed of forward solver in radar backscattering from inhomogenous rough soil.
- Implemented a stochastic modelling of the rough surface using a Kosambi-Karhunen-Loeve expansion in the Galerkin polynomial chaos basis involved in the Finite Element Method solution.

**Study of the Crab Nebula using Ground Based Gamma Ray Telescopy** **December 2013**

*Under supervision of Dr. Kuldeep Yadav, Bhabha Atomic Research Centre*

- Analysed the periodicity and spectrum of the gamma ray emission of the Crab Nebula using very high energy ground-based gamma ray telescopy methods.
- Analysed data obtained from observations made by the TACTIC telescope located at Mt. Abu, Rajasthan.

## RESEARCH EXPOSURE

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**Pulsar Observatory for Students**

**July 2013**

*Conducted by National Centre for Radio Astrophysics*

- Performed time-series observations for prominent pulsars B1642-03, B1133-16, and Vela pulsar using the Ooty Radio Telescope.
- Calculated the dispersion measure, flux density, period, modulation index and pulse broadening of B1642-03 and Vela pulsar.

**National Initiative for Undergraduate Studies Physics Camp** **May 2014 - June 2014**

*Conducted by Homi Bhabha Centre for Science Education*

- Part of 40 students selected from across India to receive research exposure on a variety of topics from prominent researchers in the field.

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<sup>1</sup>Current

<sup>2</sup>Non-graded

- Attended lectures on Stellar Astrophysics, Neutron Star Condensed Matter Physics, Newtonian Cosmology, Radio Interferometry, Quantum Computation, Solitons and Non-Linear Fibre Optics, and Particle Physics.

**Winter Internship at National Centre for Radio Astrophysics**  
*Under Dr. Tirthankar Roy Choudhary, NCRA*

**December 2014**

- Worked on mass functions defining large scale structure in cosmological models defining the early Universe, and the application of random walks in calculating and approximating these mass functions.

**International Olympiad in Astronomy and Astrophysics National Training Camp March 2013 - May 2013**

*Conducted by Homi Bhabha Centre for Science Education*

- Part of 30 students selected from across India to receive training for the International Olympiad in Astronomy and Astrophysics, in observational astronomy and theoretical astrophysics.

## TECHNICAL PROJECTS

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**Amateur Radio Interferometer Experimental System**

**July 2015 - Present**

*Under the ARIES program, IIT Delhi*

- Made an amateur radio telescope from a satellite dish capable of recording the 21cm line from measurements of the Sun.
- Currently working on building a two-dish interferometer with a tracking mount to capture 21cm galactic line.

**Multiple Sequence Alignment of DNA**

**February 2015 - May 2015**

*Course Project, Under supervision of Dr. Mausam, Dept. of Computer Science, IIT Delhi*

- Implemented depth-first-search with branch & bound for optimal solution to alignment of multiple DNA sequences.
- Implemented greedy hill-climbing local search with simulated annealing, and pseudo-random restarts, for non-optimal solution.

## TECHNICAL STRENGTHS

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**Computer Languages**

C++, Java, Python, L<sup>A</sup>T<sub>E</sub>X, Verilog

**Computational EM**

Meep (FDTD), Cubit (Meshing), Seldon

**Mathematical Computing**

MATLAB, Mathematica, R

**App Design**

iOS (Objective C)

## SCHOLASTIC ACHIEVEMENTS

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- Received Merit Scholarship for Top 7% GPA in institute in Fall Semesters, 2013 and 2014.
- Recipient of the KVPY Scholarship in the year 2011-2012
- Recipient of the NTSE Scholarship in the year 2009-2010
- Admitted to the UT Austin Computer Science Program 2013-2017

## POSITIONS OF RESPONSIBILITY

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- Executive, Astronomy Club IIT Delhi.