

Gaurav Waratkar

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I am currently working under Prof. Varun Bhalerao at the Department of Physics at IIT Bombay where I am a part of the team building Daksha, a proposed twin X-ray space telescope, which will serve as an all-sky monitor for gamma-ray bursts beating the sensitivity of the state of the art.

I am interested primarily in astronomical instrumentation & building reduction pipelines for bulk data analysis.

Experience

- **Department of Physics, IIT Bombay** **Mumbai, MH**
Project Research Assistant *May 2019 - Present*
Advisors: [Prof. Varun Bhalerao](#), [Prof. Salil Kulkarni](#), [Prof. Deepak Marla](#), [Prof. PJ Guruprasad](#), [Prof. Rakesh Mote](#)
 - Contributing towards Daksha, a twin X-ray telescope proposed to ISRO, aimed as an all-sky monitor for GRBs and EMGW follow-up, with order of magnitude higher sensitivity than current missions.
 - Performing orbital heating tests, modal analysis and static structural simulations with NX Nastran and Ansys (incorporating integration and mission costs) to ensure satellite robustness and consistency with mission goals
- **National Centre for Radio Astrophysics** **Pune, MH**
Visiting Students Research Program *May 2018 - Present*
Advisor: [Prof. Yashwant Gupta](#), Director, NCRA-TIFR
 - Working on a blind pulsar search pipeline on an ongoing pilot survey using uGMRT, where we have potentially discovered few new pulsars - Gupta et al. (in prep) to report the same in future.
 - Led in the refining of a possible radio contamination source by pre-processing raw data at the start of the pipeline.
 - Accrued 30 hours of first-hand observation experience with regular observations in the 34th cycle of GMRT.
 - Improved the pipeline by adding relevant end-product parameters for a better pipeline debugging & pulsar detection.

Education

- **Indian Institute of Technology Bombay** **Mumbai, MH**
Bachelor's in Technology in Mechanical Engineering *2015 - 2019*

Key Publications

3. Michael W. Coughlin et al. "GROWTH on GW190425: Searching thousands of square degrees to identify an optical or infrared counterpart to a binary neutron star merger with the Zwicky Transient Facility and Palomar Gattini IR". In: arXiv e-prints, [arXiv:1907.12645](https://arxiv.org/abs/1907.12645) (July 2019).
2. **G. Waratkar** et al. "LIGO/Virgo S190425z: GROWTH-India observations of the Swift/UVOT transient." In: GRB Coordinates Network [24304](#) (Apr. 2019).
1. **G. Waratkar** et al. "LIGO/Virgo S190426c: GROWTH India follow-up." In: GRB Coordinates Network [24316](#) (Apr. 2019).

Research and Technical Projects

- **EMGW Follow-up using [GROWTH-India Telescope](#)** *Jan 2019 - Present*
Advisor: [Prof. Varun Bhalerao](#), Physics Department, IIT Bombay
 - Reduced the weight of GROWTH-India telescope assembly to bring it under design specifications of the motor
 - Optically followed the 2 'visible' BNS mergers S190425z & S190426c in O3 run of LIGO-VIRGO network
 - Published several GCNs & ATels reporting the follow-up of interesting transients through GIT
 - Contributed in the automation of remote observations from IIT Bombay
 - Tutored over 20 students in remote observations through GIT for PH426 - Astrophysics course projects

- **Transient visibility from a [satellite simulator](#)**
 Advisor: *Prof. Varun Bhalerao, Physics Department, IIT Bombay* *July 2017 - April 2018*
 - Developed a Monte-Carlo based python simulator which generates all sky visibility data for a given satellite
 - Incorporated any satellite any configuration feature for detection of a random Gravitational Wave trigger
 - Designed a new algorithm for editing satellite TLEs based on user inputs using packages like PyEphem
 - Addressed the effects of SAA, earth occultation, detector sensitivity on satellite visibility in the simulator
- **Simulations on Core vs Cusp density problem of Dark Matter**
 Advisor: *Prof. D Narasimha, [Department of Astronomy and Astrophysics](#), TIFR* *Summers 2017*
- **[IIT Bombay Racing \(Powertrain Subsystem\)](#)**
 Junior Design Engineer, Mechanical Department, IIT Bombay *Sept 2016 - April 2017*

Scholastic Achievements

- Secured an **AP grade** in Machine Design course for exceptional performance | Given to just 2 out of 160 students
- Secured a **National Rank of 89** in JEST, Physics Ph.D. entrance exam organised by TIFR, Mumbai
- Secured a 99.75 percentile in JEE Mains 2015 in over 1.3 million students
- Qualified for the prestigious **Indian National Astronomy Olympiad** for being in **top 300 in the country**
- Awarded the National Talent Search (NTS) Scholarship given by NCERT Delhi, **Government of India**
- Secured an **All India Rank 18** in NMTC conducted by Association of Mathematics Teachers of India
- Awarded '**Best Outgoing Student**' from 122 students for being best overall performer over 10 years

Talks, Conferences and Schools

- [Poster presentation](#): Satellite orbital simulator at [GROWTH Annual Conference 2018](#) *Dec 2018*
- Tutor, module tester & organizer at [GROWTH Winter school 2018](#) *Dec 2018*
- Talk: Pulsars & their detection in radio data at [Krittika](#) – The Astronomy Club of IITB *Oct 2018*

Relevant Courses

- Physics: Astrophysics, Statistical Physics, Classical Mechanics, Electricity & Magnetism, Quantum Physics
- Math: High Performance Scientific Computing, Data Analysis, Numerical Analysis, Linear Algebra, Calculus

Position of Responsibility

- **[Krittika](#) – The Astronomy Club of IIT Bombay**
 Manager and Convener *2016 - 2018*
 - Received two 6" equatorial Telescopes worth over INR 80,000 as a token of appreciation from HBCSE
 - Conducted first ever outreach session for school students from slums around the institute & from Kashmir
 - Doubled the club's social media reach in 2 years helped by highly successful trips to MAST & IRO, Mt. Abu
 - Planned a budget of 0.4 million INR for night sky observations, telescope handling workshops & field trips to GMRT.

Relevant Course Projects

- Constraints on WDM by Lyman- α Forest, Astrophysics *Prof. Vikram Rentala, Physics Department*
- Dark Matter Simulations on GADGET2, Astrophysics *Prof. Vikram Rentala, Physics Department*

Extracurricular Activities

- Awarded 'Best Cadet' in National Cadet Corps (NCC) - Air Wing among 400 cadets
- Represented Hostel 7 in Volleyball in General Championships 2015, secured 2nd Place among 14 hostels
- Secured Rank 1 in multiple talent exams, quizzes in city | Secured a top 20 State rank for consecutive years