

YUGESH BHOGE

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RESEARCH EXPERIENCE

- **Population-based kilonovae distinction from BNS and NSBH mergers *** (** in process of publication*) *Apr'25 - Present*  IIT Bombay
In collaboration with Dr Ish Gupta, Prof Rahul Kashyap and Dr Mukul Bhattacharya
- Integrated modified Arnett-Chatzopoulos's lightcurve model to distinguish between various populations of BHNS and BNS mergers based on parameters related to electromagnetic observations
- **Bayesian formalism for distinguishing kilonova from NSBH and BNS mergers** *July'24 - present*  IIT Bombay
Guided by Prof Rahul Kashyap
- Developing a combined pipeline integrating Bayesian Inference (Bilby + IMRPhenomNSBH and IMRPhenomNRTidalV2 models) for GW inference and kilonova modelling for EM inference to distinguish between NSBH and BNS merger.
 - Performing parameter estimation upon intrinsic CBC parameters solely from lightcurve involves converting lightcurve properties like ejecta mass, velocity into, individual masses and tidal deformability etc.
- **Constraining Equation of State of neutron star using neutron star-black hole mergers *** *Feb'24 - Aug'25*  IIT Bombay
Guided by Prof Rahul Kashyap
- Built a Bayesian inference pipeline (Bilby + IMRPhenomNSBH and IMRPhenomNRTidalV2 models) to recover tidal deformability from simulated NSBH merger signals, achieving accurate retrieval of chirp mass, mass ratio and $\tilde{\Lambda}$
 - Demonstrated the asymmetric nature of NSBH systems yields cleaner tidal signatures than BNS mergers, enabling tighter constraints on competing neutron-star equations of state and informing 3-generation detector forecasts
- **Rayleigh-Taylor Instability in Stellar Interiors**  *Jan'25 - Apr'25*  IIT Bombay
Guided by Prof Rahul Kashyap
- Derived a general MHD dispersion relation for the Rayleigh Taylor instability with stability map plots in stellar interiors, predicted critical/fastest growing wavelengths and confirmed the theory with 2D finite volume simulations.
 - Our results confirm the stabilising influence of magnetic fields, especially for shorter wavelengths, and highlight conditions under which RTI is suppressed.
- **Design and Fabrication of Suspension System for All-Terrain Vehicle** *Mar'19 - Apr'20*  Pune University
Guided by Prof Sunil Dambare
- Designed, analysed, fabricated and tested the suspension system for an Off-road racing vehicle with the use of different software like CATIA V5 and Solidworks 2018 for design purposes, Lotus Shark and Adams for multi-body dynamics simulation and Hypermesh and Ansys R16 for analysis purposes
 - Minimized the camber gain on wheels to **0.0098deg per mm of wheel travel** also maintained the ride frequency to **1-1.8 Hz (front) and 1.1-2.0Hz(rear)** to ensure comparatively better ride quality. Simulated and verified the results using multi-body dynamics software Lotus Shark, and through experiments using rigs and the error was found to be within **1.6%**
- **Study of Aerospike Engine and its Performance Comparison with Conventional Bell-Cone type Nozzle in Single Stage To Orbit Flight** *Mar'19-Nov'19*  Pune University
Guided by Prof Sunil Dambare
- Suggested the effectiveness of aerospike nozzle in over conventional bell cone type nozzle (both modelled and tested in computational environment using CAD and CFD) by comparing their properties like **PMF**, which is decreased by **7.00%**, and **thrust coefficient**, which is increased by **26.66%**

PROJECTS

- **Blindspots in omnidirectional Interferometric Gravitational Waves detectors** *Oct'24 - Dec'24* 
Tools: PyCBC
◦ Investigated the directional sensitivity and blind spots of gravitational wave detectors (**LIGO, Virgo and KAGRA**) using PyCBC, developing mathematical models for antenna patterns and exploring mitigation strategies through multi-detector networks to improve detection sensitivity
- **Demonstration of chaos by period doubling route using Malkus waterwheel** *Aug' 24 - Oct' 24* 
Tools: Python, ImageJ
◦ Built the Malkus waterwheel alongside its mathematical model based on **Lorenz system equation, limit cycle, pitchfork**, and **subcritical Hopf bifurcation** and demonstrated its chaotic behaviour under steady flow using **self written code** in Python and used ImageJ software for the image analysis and tracing purpose
- **Transforming Alphabets into Touch: A Braille Language Project** *Sep'23 - Dec'23* 
Tools: Arduino UNO, Arduino IDE, C++
◦ Made a device which converted sentences and words from Braille language to a haptic feedback display for blind people, mapped all **26 alphabets** of Braille language into **6 segment display** also included null characters as a significant time delay pause so that the person can distinguish between the words in a sentence that uses 6 segment haptic feedback display using 6 servo motor controlled using **Arduino UNO**
- **The Eco Coach** *May'18 - Dec'19*
Design Project
◦ Design project done for the Indian Railways to mitigate the problem of littering of plastic on railway tracks, built an integrated shredder and storage assembly for storing plastic waste inside the coach

EDUCATION

- **Indian Institute of Technology, Bombay** Jul' 23 - May' 25
Mumbai, India
MSc Physics
 - CPI: 7.54/10.00
- **Savitribai Phule Pune University** Aug' 16 - Apr' 20
Pune, India
BTech Mechanical Engineering
 - CGPA: 8.85/10.00

WORKSHOPS

- **GW - Detector Characterization Workshop** Dec' 25
LISC IUCAA, Pune, India
 - Hands-on training including noise subtraction, glitch characterisation, spectral analysis, and machine learning applications in LIGO data analysis.

HONORS AND AWARDS

- **INSPIRE Scholarship** May 2016
Department of Science & Technology, Government of India
 - Awarded to the top 1 % of the national Class 12 cohort for academic excellence

PROFESSIONAL MEMBERSHIPS

- **LIGO, LSC and LISC**, Membership ID: yugeshjivaram.bhoge@ligo.org Feb'25 - Present

SKILLS

- **Programming Languages:** Python, Bash, Matlab, C++
- **HPC Architecture:** CRAY, HTCondor, Cuda
- **Mathematical & Statistical Tools:** Mathematica, L^AT_EX, OriginLabs, Matlab, Scilab
- **CAD, CAE and simulation Tools:** CATIA V5, SolidWorks, Lotus Shark, ADAMS, Ansys R16, Hypermesh, AutoCAD, LTSpice , ImageJ
- **Other Tools & Technologies:** Vi/Vim, Visual Studio Codes, Spyder, Jupyter
- **OS/GUI:** Linux, Windows, Android

POSITION OF RESPONSIBILITY

- **Internship Coordinator** Aug'23 - May'24
Training and Placement Cell, IIT Bombay [⊕]
 - Streamlined internship processes for 1500+ students; collaborated with 300+ firms globally
 - Designed targeted plans for diverse student interests in core engineering, finance, and research
- **Team Captain** Jan'19 - Apr'20
Genesis 16 Motorsports, DYPIMR, SPPU [⊕]
 - Managed a team of 25-30 people directly, and worked on building an **off-road racing vehicle**
 - Signed multiple **sponsorship deals** worth **Rs.50,000** with different industries for the project
 - Negotiated with the institute for the budget approval of **Rs 2,50,000**

VOLUNTEER EXPERIENCE

- **PE ROTA volunteer** Aug'25
LIGO Scientific Collaboration
 - Volunteered to launch 1 manual PE run for vanilla BBH event in PE ROTA shift
- **Scientific summary translator** Jul'25
LIGO Scientific Collaboration
 - Translated an exceptional event's (**GW231123**) science summary into regional languages (Marathi)
- **LIGO India Outreach Volunteer** Dec'24
LIGO INDIA
 - Volunteered at TechConnect (Techfest) with eight peers to raise awareness about gravitational waves and dispel misconceptions around the detectors as well as the detection by organising engaging educational activities, like the "Black Hole Ping Pong" game and an interactive "Stretch and Squash" selfie tool, to simplify complex concepts for diverse audiences

CERTIFICATIONS

- **International Centre for Theoretical Science, Bangalore:** Fascinating worlds of flows Jul' 23
- **Dassault's Systemes:** Certified SolidWorks Professional Dec' 20
- **Coursera & MathWorks:** Exploratory Data Analysis with MATLAB Jul' 20