RAHUL KASHYAP

CONTACT INFORMATION

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CURRENT POSITION

Postdoctoral Scholar in the Eberly College of Science, Department of Physics, Pennsylvania State University, USA. (since Nov 2017)

EDUCATION

- **Fall 2012 to Spring 2017 : Distinguished Doctoral Fellow** at University of Massachusetts Dartmouth, USA working on my PhD thesis, title "**Simulations of Type Ia Supernovae**" under supervision of Prof. Robert Fisher.
- **Aug 2007–July 2012 : Dual Degree (Masters and Bachelors of Technology)** in Ocean Engineering & Naval Architecture at Indian Institute of Technology Kharagpur, India.
- **Aug 2004–Apr 2006 : Intermiediate of Science** (*equivalent of 11^{th} and 12^{th} grade*) majoring in Mathematics, Physics, Chemistry, Patna Science College, Bihar, India.

PROFESSIONAL TRAINING

- Postdoctoral Fellow at Institute of Gravitation and Cosmos and Physics Department at Pennsylvania State University.
- Max Planck Prize Postdoctoral Fellow at Internation Centre for Theoretical Sciences (ICTS), Bengaluru, India (Jul 2017-Oct 2019).
- Argonne Training Programme in Extreme-Scale Computing (ATPESC) 2016, an advanced program to prepare for exascale computing and its application to sciences and engineering.

RESEARCH INTERESTS

- Gravitational and electromagnetic wave signals from binary neutron star mergers by detailed GRMHD and radiation hydrodynamics simulations.
- Hydrodynamical and magnetohydrodynamical modelling of binary white dwarf mergers and resulting transients such as Type Ia Supernovae and accretion-induced collapse events.
- Developing gravitational waves data analysis pipeline to constrain properties of supranuclear matter as well as exotic compact objects from current and future gravitational wave detectors.

SELECTED PUBLICATIONS

1. **Signatures of Deconfined Quark Phases in Binary Neutron Star Mergers**
   Aviral Prakash, David Radice, Domenico Logoteta, Albino Perego, Vsevolod Nedora and Bombaci, Ignazio Bombaci, **Rahul Kashyap**, Sebastiano Bernuzzi and Andrea Endrizzi *accepted Phys. Rev. D*
2. **Constraining black hole mimickers with gravitational wave observations**
   Nathan K. Johnson-McDaniel, Arunava Mukherjee, **Rahul Kashyap**, Parameswaran Ajith, Walter Del Pozzo, Salvatore Vitale, *Phys. Rev. D 102, 123010, 2020*
3. **Tests of General Relativity with Binary Black Holes from the second LIGO-Virgo Gravitational Wave Transient Catalog**
   B.P. Abbott et al., *PRD, 2020*
4. **Can Kilonova Light Curves Be Standardized?**
   Rahul Kashyap, Gayathri Raman, and Parameswaran Ajith *ApJL 886 L19, 2019*
5. **Tests of general relativity with the binary black hole signals from the LIGO-Virgo catalog GWTC-1**

B.P. Abbott et al., *Phys. Rev. D 100, 104036, 2019*

6. **Double-Degenerate Carbon-Oxygen and Oxygen-Neon White Dwarf Mergers: A New Mechanism for Faint and Rapid Type Ia Supernovae**
   Rahul Kashyap, Tazkera Haque, Pablo Lorén-Aguilar, Enrique García-Berro, Robert T. Fisher *ApJ 869 140, 2018*
7. **Constraining the Single-degenerate Channel of Type Ia Supernovae with Stable Iron-group Elements in SNR 3C 397**
   Pranav Dave, **Rahul Kashyap**,Robert Fisher,Dean Townsley, Chris Byrohl, *The Astrophysical Journal, Volume 841, Issue 1, article id. 58, 15 pp. (2017)*
8. **One-armed Spiral Instability in Double-degenerate Post-merger Accretion Disks**
   Rahul Kashyap, Robert Fisher, Enrique García-Berro, Gabriela Aznar-Siguán, Suoqing Ji, Pablo Lorén-Aguilar, *The Astrophysical Journal, Volume 840, Issue 1, article id. 16, 10 pp. (2017)*
9. **Light Curves and Spectra from a Thermonuclear Explosion of a White Dwarf Merger**
   Daniel R. van Rossum, **Rahul Kashyap**, Robert Fisher, Enrique García-Berro, Gabriela Aznar-Siguán, Suoqing Ji, Pablo Lorén-Aguilar, *The Astrophysical Journal, Volume 827, Issue 2, article id. 128, 14 pp. (2016)*
10. **Spiral Instability Can Drive Thermonuclear Explosions in Binary White Dwarf Mergers**
    Rahul Kashyap, Robert Fisher, Enrique García-Berro, Gabriela Aznar-Siguán, Suoqing Ji, Pablo Lorén-Aguilar, *The Astrophysical Journal Letters, Volume 800, Issue 1, article id. L7, 6 pp. (2015)*

Upcoming Publications

1. Impact of Prompt and Delayed Collapse on the measurement of NS Radii and Maximum Mass (*in preparation*)
   Rahul Kashyap, Abhishek Das, David Radice, Surendra Padmata, Aviral Prakash, Domenico Logoteta, Albino Perego, Daniel Godzieba, Sebastiano Bernuzzi, Ignazio Bombaci Farrukh J. Fattoyev, Brendan Reed, Andreda Silva Schneider
2. Measurement of Neutron Star Radii in third generation Gravitational Wave Detectors (*in preparation*)
   Rachael Huxford, Rahul Kashyap, Ssohrab Borhanian, Bangalore Sathyaprakash

Professional Services

- Peer reviewer for **Nature Communications**, **Physical Review Letters**, **Astrophysical Journal**, and **Monthly Notices of Royal Astronomical Society (MNRAS)** (https://publons.com/researcher/4291418/rahu kashyap/)
- LIGO Member since October 2017, active in the group responsible for published results of testing general relativity using gravitational wave observations by LIGO-Virgo collaborations.
- Member and one of the authors of Cosmic Explorer Horizon Study.
- Public outreach of LIGO during first BNS merger press release.
- Involved in various review and analysis activities for collaboration papers from LIGO.

Achievements and Awards

- Awarded 9 million service units (SU) by XSEDE for the proposal –"Numerical Simulations of Neutron Star and White Dwarf Mergers" as co-PI with PI, David Radice.
- Distinguished Doctoral Fellow at University of Massachusetts Dartmouth for 2012-2016.
- Indian Academy of Sciences Research Fellowship Program (SRFP) 2009.

Selected Talks

- Invited talk as Fundamental Theory Seminar on the numerical study of prompt and delayed collapse from BNS mergers at Institute of Gravitation and Cosmos (IGC) at Pennsylvania State University Sept, 2021.
- Prompt Collapse and their implications for properties of NS, APS April Meeting, 2021.

- Standardization of kilonovae and their application cosmology in GR22/Amaldi, Valencia, Spain 2019.
- Short talk and poster presentation on kilonvovae standardization and implications on cosmology in GWPAW, University of Maryland, College Park, USA, Dec 2018.
- Standardization of kilonovae in PAX meeting, IUCAA, Pune, India, March, 2018
- Tidal deformability tests of binary black hole mimickers at LVC Meeting Mar 2018, Sonoma State University, California, USA and Sept 2018 Maastricht, Netherlands.
- Summer School on Gravitational Wave Astronomy, ICTS, Bengaluru, July 2017
- Supernovae, Hypernovae and Binary Driven Hypernovae - Adriatic Workshop, ICRANet, Pescara, Italy.
- *The Transient Sky*, The Ninth Harvard-Smithsonian Conference on Theoretical Astrophysics, Sackler Meeting, CfA, Harvard, 2016: Poster Presentation
- Joint Fall Meeting of the APS and AAPT New England Sections, Dartmouth College: Talk
- Fifty-One Erg, 2015, University of North Carolina, Raleigh: A short talk and poster presentation.
- Spring 2015 Meeting of the APS New England Section, Boston University.
- *The Unquiet Universe*, INAF - Astronomical Observatory of Rome, Cefalu, June,2014 :Poster Presentation.

Teaching and Mentoring Experience

- Research advisor for three pre-graduate students at ICTS, Bengaluru, India – Pinaki Roy, Sumedha Biswas (now at University of Amsterdam), Abinaya Swaruba (now at Max Planck Institute of Astrophysics).
- Reading course for graduate students on Blackhole Astrophysics at ICTS, Bengaluru, India.
- Full instructor for Precalculus Class to STEM major students in Fall 2016 and Finite Mathematics to business majors in Spring 2017, UMASS Dartmouth.
- Led sections as an instructor (from Spring 2013 to Spring 2016) to physics undergraduates for topics including electrodynamics, waves, optics and modern physics, UMASS Dartmouth.

Science Outreach

- Demonstration on formation of cloud to high school students at ICTS, Bengaluru and at Indian Institute of Science, Bengaluru on National Science Day, 2018 based on one of my undergraduate experimental research work.
- Outreach article covering our work on massive binary white dwarf mergers (check here and here).
- Translation of LIGO public release in Hindi for popularization of gravitatinal wave science to high school students in India.
- Contributor to the science matter in *Cosmic Zoom*, an outreach program to demonstrate the physics active at different length scales

Computational Skills

- **Gravitational Wave Data Analysis Tools**: LALInference
- **Astrophysical Simulation Tools**: FLASH, Einstein Toolkit, MESA
- **Data Analysis and Visualization Tools**: yt,VisIt
- **Programming Language**: FORTRAN, C, Python, MATLAB
- **HPC Skills**: extensive experience in MPI/OpenMP, and parallel Python uses on large supercomputing clusters such as Stampede and Mira.