

Kshitij Aggarwal

4th year PhD candidate

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EDUCATION

- West Virginia University, WV, USA 2017 - ongoing
Ph.D in Department of Physics and Astronomy
Thesis: Optimizing the Detection of Fast Radio Transients
Advisor: Dr. Sarah Burke Spolaor
- Indian Institute of Technology, Ropar, India 2013 - 2017
Bachelor Degree in Electrical Engineering
Thesis: Optimized Beamforming for the GMRT
Advisor: Prof. Yashwant Gupta (NCRA)

UNDERGRADUATE RESEARCH POSITIONS

- **Short Term Research Student**
May'16 - Jun'16: Some experiments with the Giant Metrewave Radio Telescope (GMRT) Beamformer
Dec'15 - Jan'16: A Feasibility Study for Real-Time Narrowband RFI Filtering in the GMRT Wideband Backend
Supervisor:- Prof. Yashwant Gupta, National Centre for Radio Astrophysics, TIFR, Pune
- **Visiting Research Student**
May'15 - Jul'15: Radio Frequency Interference Mitigation Techniques for Observational Cosmology Experiments
Supervisor:- Prof. Ravi Subrahmanyam & Prof. Uday N Shankar, Raman Research Institute, Bangalore

GRANTS AND SCHOLARSHIPS

- Dr. Mohindar S. Seehra Research Award, 2021 (\$1,100)
- Chandra NASA: Demystifying Progenitors of Fast Radio Bursts (\$48,854)
- NRAO Student Observing Support (\$3,000)
- XSEDE - Pittsburgh Supercomputing Center Bridges: Deep Learning Classifier for Commensal Fast Radio Burst Searches (1200 GPU Hours)

OBSERVING PROPOSALS

- **Principal Investigator (Selected):**
 - VLA: Follow-up of Realfast Fast Radio Bursts
Awarded 27 hours, TOO observations
 - VLA: Localizing RRATs Using Realfast
Awarded 13.75 hours
 - FAST: Detecting FRBs from SLSN
Awarded 2 hours
 - Chandra Telescope: Demystifying Progenitors of FRBs
Awarded 30 ks, TOO observations
- **Co-Investigator (Selected):**
 - VLA: A hunt for a host galaxy of a fast radio burst
Awarded 40 hours
 - Arecibo: A search for Fast Radio Bursts
Awarded 176 hours
 - VLA - DDT: Localizing CHIME-Discovered Repeating FRBs with realfast
Awarded 60.48 hours, TOO observations
 - VLBA - DDT: Milliarcsecond Localization of a CHIME-Discovered Repeating Fast Radio Burst
Awarded 15 hours, TOO observations

- VLA - DDT: Sub-arcsecond Localization of a CHIME-Discovered Repeating FRB
Awarded 30 hours, TOO observations
- VLA: Fast Radio Bursts: The First Wave of Localizations
Awarded 13.5 hours, TOO observations

PUBLICATIONS

Unrefereed publications marked with [†]

First Author

1. **Kshitij Aggarwal**, Sarah Burke-Spolaor, Casey J. Law, Geoffrey C. Bower, Bryan J. Butler, Paul B. Demorest, T. Joseph W. Lazio, Justin Linford, Jessica Sydnor, and Reshma Anna-Thomas. Robust Assessment of Clustering Methods for Fast Radio Transient Candidates. *ApJ*, 914(1):53, June 2021
2. **Kshitij Aggarwal**, Sarah Burke-Spolaor, Nicolas Tejos, Giuliano Pignata, J. Xavier Prochaska, Vikram Ravi, Jane F. Kaczmarek, and Stefan Osłowski. Multiwavelength Follow-up of FRB180309. *ApJ*, 913(2):78, June 2021
3. **Kshitij Aggarwal**, Devansh Agarwal, Joseph Kania, William Fiore, Reshma Thomas, Scott Ransom, Paul Demorest, Robert Wharton, Sarah Burke-Spolaor, Duncan Lorimer, Maura McLaughlin, and Nathaniel Garver-Daniels. Your: Your Unified Reader. *The Journal of Open Source Software*, 5(55):2750, November 2020
4. Devansh Agarwal, **Kshitij Aggarwal**, Sarah Burke-Spolaor, Duncan R. Lorimer, and Nathaniel Garver-Daniels. FETCH: A deep-learning based classifier for fast transient classification. *MNRAS*, 497(2):1661–1674, September 2020
- [†] 5. **Kshitij Aggarwal**, Casey J. Law, Sarah Burke-Spolaor, Geoffrey Bower, Bryan J. Butler, Paul Demorest, Justin Linford, and T. J. W. Lazio. VLA/Realfast Detection of a Burst from FRB 180916.J0158+65 and Tests for Periodic Activity. *Research Notes of the American Astronomical Society*, 4(6):94, June 2020
- [†] 6. **K. Aggarwal** and Realfast Collaboration. VLA/realfast detection of burst from FRB180916.J0158+65. *The Astronomer’s Telegram*, 13664:1, April 2020

Contributed

1. Vikram Ravi, Casey J. Law, Dongzi Li, **Kshitij Aggarwal**, Sarah Burke-Spolaor, Liam Connor, T. Joseph W. Lazio, Dana Simard, Jean Somalwar, and Shriharsh P. Tendulkar. The host galaxy and persistent radio counterpart of FRB 20201124A. *arXiv e-prints*, page arXiv:2106.09710, June 2021
- [†] 2. Casey Law, Shriharsh Tendulkar, Tracy Clarke, **Kshitij Aggarwal**, and Suryarao Bethapudy. VLA/realfast localization and deep imaging of FRB 20201124A. *The Astronomer’s Telegram*, 14526:1, April 2021
- [†] 3. Fronefield Crawford, James Margeson, Benjamin Nguyen, Tanya Saigal, Olivia Young, Devansh Agarwal, and **Kshitij Aggarwal**. Reprocessing of a Green Bank 43 m Telescope Survey of Unidentified Bright Radio Sources for Pulsars and Radio Bursts. *Research Notes of the American Astronomical Society*, 5(2):21, February 2021
4. **Kshitij Aggarwal**, Tamás Budavári, Adam T. Deller, Tarraneh Eftekhari, Clancy W. James, J. Xavier Prochaska, and Shriharsh P. Tendulkar. Probabilistic Association of Transients to their Hosts (PATH). *ApJ*, 911(2):95, April 2021
5. Casey J. Law, Bryan J. Butler, J. Xavier Prochaska, Barak Zackay, Sarah Burke-Spolaor, Alexandra Mannings, Nicolas Tejos, Alexander Josephy, Bridget Andersen, Pragya Chawla, Kasper E. Heintz, **Kshitij Aggarwal**, Geoffrey C. Bower, Paul B. Demorest, Charles D. Kilpatrick, T. Joseph W. Lazio, Justin Linford, Ryan Mckinven, Shriharsh Tendulkar, and Sunil Simha. A Distant Fast Radio Burst Associated with Its Host Galaxy by the Very Large Array. *ApJ*, 899(2):161, August 2020
6. Aaron Tohuvavohu, Casey J. Law, Jamie A. Kennea, Elizabeth A. K. Adams, **Kshitij Aggarwal**, Geoffrey Bower, Sarah Burke-Spolaor, Bryan J. Butler, John M. Cannon, S. Bradley Cenko, James DeLaunay, Paul Demorest, Maria R. Drout, Philip A. Evans, Alec S. Hirschauer, T. J. W. Lazio, Justin Linford, Francis E. Marshall, K. McQuinn, Emily Petroff, and Evan D. Skillman. A Demonstration of Extremely Low Latency γ -ray, X-Ray & UV Follow-Up of a Millisecond Radio Transient. *arXiv e-prints*, page arXiv:2006.04550, June 2020
- [†] 7. Nipuni Palliyaguru, **Kshitij Aggarwal**, and Devansh Agarwal. Arecibo search for radio bursts following a previous

8. B. Marcote, K. Nimmo, J. W. T. Hessels, S. P. Tendulkar, C. G. Bassa, Z. Paragi, A. Keimpema, M. Bhardwaj, R. Karuppusamy, V. M. Kaspi, C. J. Law, D. Michilli, **K. Aggarwal**, B. Andersen, A. M. Archibald, K. Bandura, G. C. Bower, P. J. Boyle, C. Brar, S. Burke-Spolaor, B. J. Butler, T. Cassanelli, P. Chawla, P. Demorest, M. Dobbs, E. Fonseca, U. Giri, D. C. Good, K. Gourdji, A. Josephy, A. Yu. Kirichenko, F. Kirsten, T. L. Landecker, D. Lang, T. J. W. Lazio, D. Z. Li, H. H. Lin, J. D. Linford, K. Masui, J. Mena-Parra, A. Naidu, C. Ng, C. Patel, U. L. Pen, Z. Pleunis, M. Raffei-Ravandi, M. Rahman, A. Renard, P. Scholz, S. R. Siegel, K. M. Smith, I. H. Stairs, K. Vanderlinde, and A. V. Zwaniga. A repeating fast radio burst source localized to a nearby spiral galaxy. *Nature*, 577(7789):190–194, Jan 2020
9. D. R. Madison, D. Agarwal, **K. Aggarwal**, O. Young, H. T. Cromartie, M. T. Lam, S. Chatterjee, J. M. Cordes, N. Garver-Daniels, D. R. Lorimer, R. S. Lynch, M. A. McLaughlin, S. M. Ransom, and R. S. Wharton. A Deep Targeted Search for Fast Radio Bursts from the Sites of Low-redshift Short Gamma-Ray Bursts. *ApJ*, 887(2):252, Dec 2019
10. C. J. Law, C. M. B. Omand, K. Kashiyaama, K. Murase, G. C. Bower, **K. Aggarwal**, S. Burke-Spolaor, B. J. Butler, P. Demorest, T. J. W. Lazio, J. Linford, S. P. Tendulkar, and M. P. Rupen. A Search for Late-time Radio Emission and Fast Radio Bursts from Superluminous Supernovae. *ApJ*, 886(1):24, Nov 2019
11. Yunpeng Men, **Kshitij Aggarwal**, Ye Li, Divya Palaniswamy, Sarah Burke-Spolaor, K. J. Lee, Rui Luo, Paul Demorest, Shriharsh Tendulkar, Devansh Agarwal, Olivia Young, and Bing Zhang. Non-detection of fast radio bursts from six gamma-ray burst remnants with possible magnetar engines. *MNRAS*, page 2059, Aug 2019
12. M. Vallisneri, S. R. Taylor, J. Simon, W. M. Folkner, R. S. Park, C. Cutler, J. A. Ellis, T. J. W. Lazio, S. J. Vigeland, **K. Aggarwal**, Z. Arzoumanian, P. T. Baker, A. Brazier, P. R. Brook, S. Burke-Spolaor, S. Chatterjee, J. M. Cordes, N. J. Cornish, F. Crawford, H. T. Cromartie, K. Crowter, M. DeCesar, P. B. Demorest, T. Dolch, R. D. Ferdman, E. C. Ferrara, E. Fonseca, N. Garver-Daniels, P. Gentile, D. Good, J. S. Hazboun, A. M. Holgado, E. A. Huerta, K. Islo, R. Jennings, G. Jones, M. L. Jones, D. L. Kaplan, L. Z. Kelley, J. S. Key, M. T. Lam, L. Levin, D. R. Lorimer, J. Luo, R. S. Lynch, D. R. Madison, M. A. McLaughlin, S. T. McWilliams, C. M. F. Mingarelli, C. Ng, D. J. Nice, T. T. Pennucci, N. S. Pol, S. M. Ransom, P. S. Ray, X. Siemens, R. Spiewak, I. H. Stairs, D. R. Stinebring, K. Stovall, J. K. Swiggum, R. van Haasteren, C. A. Witt, and W. W. Zhu. Modeling the uncertainties of solar-system ephemerides for robust gravitational-wave searches with pulsar timing arrays. *arXiv e-prints*, page arXiv:2001.00595, Jan 2020
13. **K. Aggarwal**, Z. Arzoumanian, P. T. Baker, A. Brazier, M. R. Brinson, P. R. Brook, S. Burke-Spolaor, S. Chatterjee, J. M. Cordes, N. J. Cornish, F. Crawford, K. Crowter, H. T. Cromartie, M. DeCesar, P. B. Demorest, T. Dolch, J. A. Ellis, R. D. Ferdman, E. Ferrara, E. Fonseca, N. Garver-Daniels, P. Gentile, J. S. Hazboun, A. M. Holgado, E. A. Huerta, K. Islo, R. Jennings, G. Jones, M. L. Jones, A. R. Kaiser, D. L. Kaplan, L. Z. Kelley, J. S. Key, M. T. Lam, T. J. W. Lazio, L. Levin, D. R. Lorimer, J. Luo, R. S. Lynch, D. R. Madison, M. A. McLaughlin, S. T. McWilliams, C. M. F. Mingarelli, C. Ng, D. J. Nice, T. T. Pennucci, N. S. Pol, S. M. Ransom, P. S. Ray, X. Siemens, J. Simon, R. Spiewak, I. H. Stairs, D. R. Stinebring, K. Stovall, J. Swiggum, S. R. Taylor, J. E. Turner, M. Vallisneri, R. van Haasteren, S. J. Vigeland, C. A. Witt, W. W. Zhu, and NANOGrav Collaboration. The NANOGrav 11 yr Data Set: Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries. *ApJ*, 880(2):116, Aug 2019
14. **K. Aggarwal**, Z. Arzoumanian, P. T. Baker, A. Brazier, P. R. Brook, S. Burke-Spolaor, S. Chatterjee, J. M. Cordes, N. J. Cornish, F. Crawford, H. T. Cromartie, K. Crowter, M. Decesar, P. B. Demorest, T. Dolch, J. A. Ellis, R. D. Ferdman, E. C. Ferrara, E. Fonseca, N. Garver-Daniels, P. Gentile, D. Good, J. S. Hazboun, A. M. Holgado, E. A. Huerta, K. Islo, R. Jennings, G. Jones, M. L. Jones, D. L. Kaplan, L. Z. Kelley, J. S. Key, M. T. Lam, T. J. W. Lazio, L. Levin, D. R. Lorimer, J. Luo, R. S. Lynch, D. R. Madison, M. A. McLaughlin, S. T. McWilliams, C. M. F. Mingarelli, C. Ng, D. J. Nice, T. T. Pennucci, N. S. Pol, S. M. Ransom, P. S. Ray, X. Siemens, J. Simon, R. Spiewak, I. H. Stairs, D. R. Stinebring, K. Stovall, J. K. Swiggum, S. R. Taylor, M. Vallisneri, R. Van Haasterer, S. J. Vigeland, C. A. Witt, and W. W. Zhu. The NANOGrav 11-Year Data Set: Limits on Gravitational Wave Memory. *arXiv e-prints*, page arXiv:1911.08488, Nov 2019
15. Kaushal D. Buch, Shruti Bhatporia, Yashwant Gupta, Swapnil Nalawade, Aditya Chowdhury, Kishor Naik, **Kshitij Aggarwal**, and B. Ajithkumar. Towards Real-Time Impulsive RFI Mitigation for Radio Telescopes. *Journal of Astronomical Instrumentation*, 5(4):1641018, Dec 2016

TEACHING

- **Guest Lecture:** Antenna Fundamentals (Graduate-level Radio Astronomy, February 2020), West Virginia University
- **Guest Lecture:** Stellar Structures and Star Formation (Honors Astronomy, March 2019), West Virginia University
- **Workshop Assistant:** Software Carpentry Workshop (January 2018), West Virginia University
- **Graduate Teaching Assistant:** Introductory Physics (Fall 2017, Spring 2018), West Virginia University
- **Laboratory Instructor:** Introductory Physics (Fall 2017, Spring 2018), West Virginia University
- **Graduate Teaching Assistant:** Introductory Astronomy (Fall 2017), West Virginia University

STUDENT MENTORSHIP

- Olivia Young (WVU, Undergrad) 2018 - 2020
 - GPU accelerated single pulse search using HEIMDALL and `fetch`
 - Understanding the limits of periodicity search softwares
- Morgan Waddy (U.Va., Undergrad) 2020 - ongoing
 - Bayesian Rate Estimation for FRBs
- Sahil Atri (IISER Tirupati, Master Thesis) 2021 - ongoing
 - GPU accelerated single pulse search on Arecibo Drift Scan Survey

SELECTED TALKS

- *Population synthesis study of MSP spectral indices*, International Pulsar Timing Array Meeting, June'21
- *Results from Realfast system at VLA*, 237th American Astronomical Society meeting, Jan'21
- *The Petabyte Project*, NANOGrav Fall meeting, Oct'20
- *The Petabyte Project*, FRB conference, July'20
- *Detection, Localization and Automated Classification of Fast Radio Bursts*, Astrophysics Seminar, Raman Research Institute, Bangalore, June'19 (**Invited**)
- *Spectral Index study of Millisecond Pulsars*, International Pulsar Timing Array Meeting, Pune, June'19
- *Realfast: Real-time fast transient search system at VLA*, Enabling Multi-Messenger Astrophysics in the Big Data Era, Baltimore, April'19
- *Realfast: Real-time fast transient search system at VLA*, FRB conference, Amsterdam, Feb'19
- *Machine learning techniques for FRB searches with Realfast*, Lunch Talk, AOC - NRAO, Socorro, New Mexico, Nov'18

OPEN-SOURCE SOFTWARE

- **your:** Your Unified Reader
- **fetch:** Fast Extragalactic Transient Candidate Hunter
- **burstfit:** Spectro-temporal modeling of FRBs
- **frbpa:** Periodicity analysis of FRBs

TECHNICAL PROFICIENCY

- **Languages** Python, Bash, CUDA C, MATLAB
- **Packages** Python (Keras, Scikit-Learn, TensorFlow, PyTorch, Pandas, Scipy, Numpy, Matplotlib)
MATLAB (Simulink, Antenna Toolbox, Phased Array Toolbox, Image Processing Toolbox)
- **Tools** MongoDB, Elasticsearch, Git, Docker
- **Cloud** AWS (EC2, S3, Sagemaker), GCP

COMMUNITY ACADEMIC SERVICES

- Reviewer for Monthly Notices of the Royal Astronomical Society
- Reviewer for Journal of Open Source Software