SAVIN SHYNU VARGHESE

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Professional Employment

Postdoctoral Research Fellow 07/2021-present

SETI Institute, Mountain View, CA, USA

Postdoctoral Research Fellow 01/2021 - 06/2021

University of New Mexico (UNM), Albuquerque, USA

Education

PhD in Physics with Astrophysics concentration 2016-2020
University of New Mexico, Albuquerque, USA
Thesis Advisor: Prof. Gregory B. Taylor
Thesis Title: Monitoring the Low Frequency Radio Transient Sky with the Long Wavelength Array.

MS in Physics with Astrophysics concentration 2018
University of New Mexico, Albuquerque, USA

BS - MS in Physics 2010-2015
IISER Bhopal, India
Thesis Advisor: Dr. Rajib Saha
Thesis Title : Estimation of Cosmological Parameters from Cosmic Microwave Background.

Research Experience

Gradute Research Assistant with Prof. Gregory B. Taylor 2016-2020
Department of Physics and Astronomy, UNM

- PhD research with Prof. Gregory B. Taylor, Dr. Kenneth Obenberger & Dr. Jayce Dowell in the Long Wavelength Array (LWA) radio telescope group on an NSF funded project.
- Continuous all-sky transient monitoring in two LWA stations (LWA1 & LWA-SV) using the 100 kHz bandwidth narrowband imager. This resulted in the detection of a new type of cosmic transient source at 34 MHz. Also, observations of meteor radio afterglows (MRAs)/radio emission from meteors using two stations revealed the isotropic nature of emission.
- Key member in commissioning the new 20 MHz broadband imager at LWA-SV.
- Developed the transient search pipeline for the broadband imager at LWA-SV and continuous monitoring of cosmic transients (e.g. polarized emission from exoplanets) and MRAs.

- Understanding the correlation between spectral parameters and physical properties of MRAs using their broadband spectra.
- Hunting low frequency emission from repeating and non-repeating FRBs as well as new cosmic transients using high time resolution beamformed observations with LWA.
- Imaging and transient search of the OVRO-LWA data using high performance computing at the Center for Advanced Research Computing (CARC), UNM
- Evidence of fossil emission around compact symmetric objects (young radio galaxies) as a tool to study the AGN Duty Cycles. Used GMRT TGSS Survey snapshot images and VLA data. Collaborated with Dr. Dale A. Frail (NRAO).

Gradute Research Assistant with Dr. Matthew Fricke 2019
Center for Advanced Research Computing (CARC), UNM

- Resolved user's help tickets in a timely manner. Helped CARC users to build, install, test, and run advanced research computing libraries and applications. Also, worked with senior CARC staff to resolve issues with computing hardware and software.

Research Fellow with Dr. Rajib Saha 2014-2015
IISER Bhopal

- Estimated cosmological parameters from the Cosmic Microwave Background (CMB) data. Developed code to find the best fit cosmological parameters from the CMB experimental data using Markov Chain Monte Carlo algorithm.

Summer Research Fellow with Dr. Rajib Saha 2013
IISER Bhopal

- Developed an OpenGL code to implement the physics of gravity that would depict the interactions of galaxies in the universe.

Summer Research Fellow with Dr. Prateek Sharma 2012
IISc Bangalore

- Theoretical investigation of various physical processes like turbulence, self-gravity and other thermal processes required for star formation.

Refereed Publications

1. **Varghese, S. S.**, Dowell, J., Obenberger K. S., & Taylor, G. B., 2020
   Broadband Imaging to Study the Spectral Distribution of Meteor Radio Afterglows, JGR Space Physics (accepted), https://arxiv.org/abs/2103.03347
2. K. S. Obenberger, J. Dowell, C.T. Fallen, J. M. Holmes, G.B. Taylor & **S.S. Varghese**
   Using Broadband Radio Noise from Power-Lines to Map and Track Dense E_s Structures, Radio Science, https://doi.org/10.1029/2020RS007169
3. K.S. Obenberger, J.M. Holmes, S.G. Ard, J. Dowell, N.S. Shuman, G.B. Taylor, **S.S. Varghese**, & A.A. Viggiano (2020)
   Association between Meteor Radio Afterglows and Optical Persistent Trains.
   Journal of Geophysical Research: Space Physics, https://doi.org/10.1029/2020JA028053
4. **Varghese, S. S.**, Obenberger, K. S., Taylor, G. B., & Dowell, J. (2019).
   Testing the Radiation Pattern of Meteor Radio Afterglow.
   Journal of Geophysical Research: Space Physics, 124 (12), 10749-10759,
   https://doi.org/10.1029/2019JA026922
5. **Varghese, S. S.**, Obenberger, K. S., Dowell, J.,& Taylor, G. B. (2019, apr).
   Detection of a Low-frequency Cosmic Radio Transient using Two LWA stations.
   The Astrophysical Journal, 874 (2), 151,
   https://doi.org/10.3847%2F1538-4357%2Fab07c6

Papers in Preparation

1. **Varghese, S. S.**, Dowell, J., Obenberger K. S., Taylor, G. B., Hallinan, G., & Anderson, M., 2020
   High Resolution Observations of Radio Transients with the OVRO-LWA.

Scientific and Technical Reports

1. Dowell, J., **Varghese, S.S.**, & Taylor, G. B.,
   LWA Memo # 215 : The Orville Wideband Imager, Sept 09, 2020
   http://www.phys.unm.edu/ lwa/memos/memo/lwa0215.pdf

2. Dowell, J., & **Varghese, S.S.**
   LWA Memo # 206 : LWA-SV Pointing Error and Correction, Oct 20, 2017
   http://www.phys.unm.edu/ lwa/memos/memo/lwa0206.pdf

Skills

Programming Languages	Python, C, Fortran, Matlab, Mathematica, LabVIEW & OpenGL
Software	AIPS, CASA, Presto, WSclean, DS9, Difmap, IRAF, CosmoMC, CAMB, Origin Lab, LATEX & Microsoft Office
Operating System	Linux (Ubuntu, Redhat, CentOS), Windows & macOS
HPC tools	PBS/Torque, Slurm, Docker/Singularity, GNU Parallel & MPI
Additional Skills	Synthesis Imaging, VLA & VLBA Data Reduction, High Performance Computing, Machine Learning, Image Processing, Data Analysis & Parallel Computing

Graduate Fellowships, Research & Teaching Assistantships

- Research Assistant with Prof. Gregory B. Taylor, UNM — 2016-2020
- Graduate Studies Excellence Assistantship with Dr. Matthew Fricke, Center for Advanced Research Computing (CARC), UNM — 2019
- Teaching Assistant at UNM for Introductory Physics Lab — 2017 - 2018
- Teaching Assistant at UNM for Introductory Astronomy Lab — 2016 -2017
- GATE, India — 2015
- Research Fellow with Dr. Rajib Saha, IISER Bhopal — 2014-2015
- Summer Research Fellow with Dr. Rajib Saha, IISER Bhopal — 2013
- IAS/INSA Summer Research Fellow with Dr. Prateek Sharma, IISc Bangalore — 2012
- INSPIRE Research Fellowship by Department of Science and Technology, Govt. Of India — 2010-2015

Seminars & Conference Presentations

Invited Talks

- "High Resolution Observations of Meteor Radio Afterglows with the OVRO-LWA", LWA Users Meeting, Albuquerque, NM, August 16, 2021
- "Monitoring the Low Frequency Radio Transient Sky with the Long Wavelength Array'", Berkeley SETI Research Center, zoom, July 22, 2021

Contributed Talks

- "Monitoring the Low Frequency Radio Transient Sky with the Long Wavelength Array'", Department of Physics and Astronomy/zoom, University of New Mexico, Albuquerque, October 29, 2020
- "Studying Meteor Radio Afterglows with the Long Wavelength Array", LWA Users Meeting, zoom/Albuquerque, NM, July 30, 2020
- "Studying Meteor Radio Afterglows with the Long Wavelength Array", Department of Physics and Astronomy, University of New Mexico, Albuquerque, May 07, 2020
- "Studying Meteor Radio Afterglows with the Long Wavelength Array and Widefield Persistent Train Camera", 35th New Mexico Symposium, Very Large Array Operations Center, Socorro, Feb 21, 2020
- "Studying Meteor Radio Afterglows with the Long Wavelength Array", Science at Low Frequencies in Tempe, Arizona, December 9-11, 2019
- "Studying Meteor Radio Afterglows with the Long Wavelength Array", LWA Users Meeting, Albuquerque, NM, August 1-3, 2019
- "Studying Meteor Radio Afterglows with the Long Wavelength Array", Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR), Santa Fe, NM, June 16 - 21, 2019
- "Monitoring the Long Wavelength Radio Transient Sky using two LWA stations", Department of Physics and Astronomy, University of New Mexico, Albuquerque, April 18, 2019
- "Detection of a Low Frequency Cosmic Radio Transient using Two LWA Stations ", 34th New Mexico Symposium, Very Large Array Operations Center, Socorro, Nov 9, 2018
- "Testing the Nature of Meteor Radio Afterglow (MRA)", Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR), Santa Fe, NM, June 25 - 29, 2018
- "Testing the Nature of Meteor Radio Afterglow (MRA)", Department of Physics and Astronomy, University of New Mexico, Albuquerque, May 10, 2018

Posters

- "Broadband Radio All-sky Imaging at Low-frequencies using HPC", Ninth Annual Rocky Mountain Advanced Computing (RMAAC) Symposium, Boulder, CO, May 21-23, 2019
- "Fossil Emission Around Young Radio Galaxies and the AGN Duty Cycle", 33rd New Mexico Symposium, Very Large Array Operations Center, Socorro, Nov 3, 2017

Attended Workshops and Meetings

- 16th Synthesis Imaging Workshop, Very Large Array Operations Center, Socorro, May 16 - 23, 2018
- 99th Indian Science congress in KIIT University, Bhubaneswar, India, Jan 3-7, 2012
- Amazing Particles and Light: Horizons in Accelerators and Enabled Sciences: Dec 15-16, 2011, IISc Bangalore

References

1. Prof. Gregory B. Taylor
   Distinguished Professor
   Director of the Center for Astrophysical Research and Technologies (CART)
   Department of Physics and Astronomy, University of New Mexico
   Albuquerque, NM, USA
   Phone: 505-277-2616
   Email: gbtaylor@unm.edu

2. Dr. Kenneth Obenberger
   Research Physicist
   Space Vehicles Directorate, Air Force Research Laboratory
   Kirtland AFB, Albuquerque, NM, USA
   Phone: 505-853-1133
   Email: kenneth.obenberger@gmail.com/kenneth.obenberger.1@us.af.mil

3. Dr. Jayce Dowell
   Research Assistant Professor
   Department of Physics and Astronomy, University of New Mexico
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