

JACOB CARDINAL TREMBLAY

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EDUCATION

Universität Bonn

Master of Science in Astrophysics

Projected Graduation Date - March 2024

West Virginia University

Bachelor of Science in Physics, Cum Laude

August 2017 - May 2021

RESEARCH EXPERIENCE

Frequency Evolution Behaviour in Pulsars with the UBB Receiver

March 2023 - Present

Advisors: Prof. Michael Kramer and Dr. Ramesh Karuppusamy

MPIfR

- MSc thesis project at the Max Planck Institute for Radio Astronomy (MPIfR) which builds upon a six week internship conducted during the winter semester of 2022/23.
- Currently examining the possibility of using new statistical and machine learning methods to mitigate radio frequency interference (RFI) in single pulse data from the Ultra-Broadband receiver (UBB). Existing RFI mitigation techniques were explored during the internship.
- Planning to use this UBB data to study pulsar emission mechanisms on a multitude of pulsars by analyzing polarization and pulse profile. Multi-component Gaussians were fit to pulsar B0355+54 during the internship in order to study the emission height.

Optimal Frequency Channelization for Pulsar Dispersion Measurements

Jan 2021 - Present

Advisors: Dr. Maura McLaughlin

West Virginia University

- Simulated pulsar data based on known NANOGrav pulsars using the *Pulsar Signal Simulator* Python package.
- Currently developing a model to minimize the uncertainty in dispersion measure depending on different pulsar parameters to aid in the detection of gravitational waves from pulsar timing arrays.

Analysis of Dispersion Measure Variations in NANOGrav Pulsars

May 2020 - Aug 2020

Advisors: Dr. Cherry Ng and Dr. James McKee

University of Toronto

- Used extremely high cadence observation data from CHIME to make high quality 2-D templates by creating and implementing BASH and Python pipelines, as well as manual RFI cleaning in order to measure TOAs through template matching.
- Evaluated DM variation statistics such as periodicity, Kolmogorov turbulence, solar wind signature and evidence of discrete plasma structures in order to increase NANOGrav sensitivity.

Pulsar Searching from Fermi Gamma-ray Sources

Aug 2019 - Aug 2021

Advisor: Dr. Maura McLaughlin

West Virginia University

- Visual plot evaluation in an effort to discover new millisecond pulsars to be used by NANOGrav in pulsar timing arrays.

REFEREED PUBLICATIONS

1. Kshitij Aggarwal, Devansh Agarwal, Evan F. Lewis, Reshma Anna-Thomas, **Jacob Cardinal Tremblay**, Sarah Burke-Spolaor, Maura A. McLaughlin, and Duncan R. Lorimer. Comprehensive Analysis of a Dense Sample of FRB 121102 Bursts. *The Astrophysical Journal*, arXiv:2107.05658, Sept. 2021.

SKILLS

Computer Languages:

Proficient in

Python, Bash, Java, LaTeX

Basic knowledge of

LabView, MatLab

Skills & Training

Trained on Uni-Bonn's 50 cm and WVU's 36 cm telescopes, various machining tools, soldering, basic computer engineering

Languages

Fluent in English and French, elementary knowledge of German

GRANTS AND AWARDS

BCGS Scholarship

University of Bonn

2021-2023

Scholarship which provides funding to cover full living expenses during the MSc. Awarded to the top applicants of the Bonn-Cologne Graduate School of Physics and Astronomy.

IAU Grant

IAUGA

2022

Travel grant awarded for participation in the 2022 International Astronomers Union General Assembly in Busan, South Korea. Awarded by the IAU.

Student KAS Grant

IAUGA

2022

Grant covering registration fees and accommodation awarded for participation in the 2022 International Astronomers Union General Assembly in Busan, South Korea. Awarded by the Korean Astronomical Society.

BCGS Travel Grant

IAUGA

2022

Grant awarded for participation in the 2022 International Astronomers Union General Assembly in Busan, South Korea. Awarded by the Bonn-Cologne Graduate School of Physics and Astronomy.

SURP Fellowship

University of Toronto

Summer 2020

Fellowship for research with the Summer Undergraduate Research Program (SURP) at the David A. Dunlap Department of Astronomy and Astrophysics and the Dunlap Institute for Astronomy and Astrophysics at the University of Toronto.

Ratna and Vaman Naik Endowed Physics Scholarship

West Virginia University

2020 - 2021

Scholarship awarded to students who display excellence in academic merit.

National Space Grant Foundation Undergraduate Fellowship

West Virginia University

2019 - 2020, 2020-2021

Fellowship and scholarship to aid in research projects.

CSCAA Scholar All-American, First Team

West Virginia University

2019 - 2020

Athlete achieving a GPA of 3.5 or higher and invited to the NCAA Swimming and Diving Championships.

President's List

West Virginia University

Spring 2020

Students who receive a GPA of 4.0 for the given semester.

Athletic Scholarship

West Virginia University

2017 - 2021

Awarded athletic scholarship to compete on West Virginia University's NCAA division I diving team.

International Student Scholarship

West Virginia University

2017 - 2021

Scholarship awarded to international students with a GPA of 3.2 or higher.

OUTREACH AND MENTOR POSITIONS

Radio Astronomy Lab

April 2023 - Present

*Tutor**Universität Bonn*

- Teaching assistant for the radio astronomy lab course for students completing their MSc at the University of Bonn. Helped students use the Stockert 25m Radio Telescope to observe galaxies and pulsars. Other responsibilities included conducting oral examinations and grading the final lab report.

West Virginia University Astronomy Club

2020 - 2021

*President**West Virginia University*

- Gave bi-weekly interactive astronomy related presentations, organized events such as telescope nights and stargazing parties, and helped guide younger students through their undergraduate careers.

Pulsar Search Collaboratory

Sept 2019 - August 2021

*Mentor**West Virginia University*

- Outreach to high school students which involves both introducing pulsar astronomy and helping them learn to search for pulsars.

Greenbank Observatory Open House

September 8th, 2019

*WVU Department of Physics and Astronomy Ambassador**West Virginia University*

- Gave physics presentations to the general public and explained the concepts which makes them possible.

AIfA Social Committee

September 2022 - Present

*Member**Universität Bonn / AIfA*

- Helped organized events such as telescope nights and stargazing parties, as well as other social events for the members of the Argelander Institute for Astronomy (AIfA).

MPIfR Sustainability Committee

August 2023 - Present

*Member**Max Planck Institute for Radio Astronomy*

- Project focusing on tracking the CO2 footprint of research and activities at the Max Planck Institute for Radio Astronomy.