

## PROFILE

I am a **postdoctoral researcher** at Observatoire de Paris studying radio emission from the sun. I am currently improving a **machine learning** algorithm I developed with **TensorFlow** to automatically detect solar radio emission using the state of the art **NenuFAR** radio telescope. I have been using **Python** for over ten years, the last six of which were focused on performing **data analysis**, **data visualisation** and **data modelling**. Throughout this time I have written and developed my own code with **software engineering** best practices. My strong technical background and **problem solving** skills help me take on any challenge. While I love the **independence** and autonomy of my current position, I am looking to use my skills in a new environment with a stronger emphasis on **teamwork**.

## EXPERIENCE

### Postdoctoral Researcher, Observatoire de Paris, Meudon — 2022-Present

- Developed and implemented a new machine learning model to automatically detect solar radio emissions in high resolution NenuFAR data.
- Presented my research at prominent scientific conferences throughout Europe.
- Contributed to community documentation and tutorials on how to perform solar radio imaging. Enhanced the technical description of how to analyse complex interferometric data.
- Implemented a database of solar radio observations made with I-LOFAR, Ireland's most advanced radio telescope. The database can be queried with SQL and delivers solar radio data to the research community.

### PhD Researcher, Trinity College Dublin and Dublin Institute for Advanced Studies — 2017-2022

- Analysed large datasets using Python to transform raw radio astronomy data into scientific insight.
- Implemented unique data visualization and data modelling for solar radio observations which lead to the publication of my first research paper.
- Improved my written communication skills by publishing in leading scientific journals.
- Honed my oral communication skills by presenting at international conferences and giving a wide variety of science outreach talks.

### Lead Educator, Trinity Walton Club, Dublin — 2017-2019

- Responsible for designing and teaching a physics and maths syllabus for Trinity Walton Club, a STEM club for 12-17 year olds.
- Explained more advanced topics in physics and maths at an appropriate level for younger students.
- Managed group research projects. Acted as a mentor, providing materials and expertise necessary for each group to conduct their research and present it to an audience including academic staff at Trinity College Dublin.

### Laboratory Teaching Assistant, School of Physics, Trinity College Dublin — 2017-2019

- Demonstrated for undergraduate physics laboratories for Junior Sophister (3rd year) students.
- Responsible for troubleshooting laboratory equipment and ensuring students understood the task at hand.
- Taught a breadth of fundamental and applied concepts in physics, as well as experimental techniques and how to operate laboratory equipment safely.
- Adapted my teaching style depending on a student's level of knowledge.

## EDUCATION

### Trinity College Dublin and Dublin Institute for Advanced Studies — PhD Solar Physics 2017-2022

- Developed software to process terabytes of data from Europe's largest radio telescope using high performance computing clusters.
- Developed and installed the REALtime Transient Acquisition (REALTA) computing backend for recording and processing data from the Irish LOFAR station I-LOFAR in Birr, County Offaly. This involved putting the servers in place, configuring the fibre network, installing SSDs and setting the appropriate RAID level for each of the four servers.
- Received first class honours in the Tools for Scientific and Technical Computing module taught as part of the MSc in High Performance Computing.

### Trinity College Dublin — B.A. Mod. Physics and Astrophysics 2013-2017

- Determined the statistical relation between the velocity of waves in the solar corona with other solar phenomena. Presented a research poster of the project to academic staff. The presentation and project report were awarded a grade of first class honours.
- Awarded gold medal for exceptional merit at degree examinations.
- Elected astrophysics class representative for Trinity College Dublin Student Union (TCDSU). Voted on behalf of the class at monthly TCDSU council meetings
- Elected School of Physics convener for TCDSU. Sat on school executive meetings representing the concerns of all students in the School of Physics. Organised meetings with other School of Physics class reps.
- Cohosted a weekly radio show on Trinity FM.

## SKILLS

### Core

- Oral and written communication.
- Independently driven research.
- Teaching.
- Data analysis using Python (NumPy, Pandas, etc.).
- Data visualization with matplotlib, HoloViews.
- Data modelling with SciPy, NumPy.
- Machine learning with TensorFlow, scikit-learn.
- Software engineering and development with Python.
- Version control with git.

### Computer Languages

Python, Bash, LaTeX, SQL, C.

### Operating Systems

macOS, Linux, Windows.

### Languages

English as a first language, lower intermediate French.

## AWARDS AND SCHOLARSHIPS

- Winner of best short talk at the Irish National Astronomy Meeting 2019.
- Recipient of the Irish Research Council Government of Ireland Postgraduate Scholarship.
- Awarded gold medal for exceptional merit in final year undergraduate exams.

## PERSONAL INTERESTS

Cycling, musical theatre, choral singing.

## PUBLICATIONS

Segmentation of low frequency solar radio spikes

**Murphy, Pearse C.** ; Cecconi, Baptiste ; Briand, Carine ; Aicardi, Stéphane  
(in prep)

Automatic detection of solar radio bursts in NenuFAR observations

**Murphy, Pearse C.** ; Cecconi, Baptiste ; Briand, Carine ; Aicardi, Stéphane  
Planetary, Solar and Heliospheric Radio Emissions IX (2023)

Probing the Solar Corona at High Temporal and Spatial Resolution with the Low Frequency Array

**Pearse C. Murphy**

PhD Thesis

First Results from the real-time Transient Acquisition (REALTA) backend at the Irish LOFAR station

**Pearse C. Murphy** ; Callanan, P. ; McCauley, J. ; McKenna, D. J. ; Fionnagáin, D. Ó. ; Louis, C. K. ; Redman, M. P. ; Cañizares, L. A. ; Carley, E. P. ; Maloney, S. A. ; Coghlan, B. ; Daly, M. ; Scully, J. ; Dooley, J. ; Gajjar, V. ; Giese, C. ; Brennan, A. ; Keane, E. F. ; Maguire, C. A. ; Quinn, J. ; Mooney, S. ; Ryan, A. M. ; Walsh, J. ; Jackman, C. M. ; Golden, A. ; Ray, T. P. ; Doyle, J. G. ; Rigney, J. ; Burton, M. ; Gallagher, P. T.

Astronomy & Astrophysics, Volume 655 (2021)

LOFAR Observations of Radio Burst Source Sizes and Scattering in the Solar Corona

**Pearse C. Murphy**, Eoin P. Carley, Aoife Maria Ryan, Pietro Zucca, Peter T. Gallagher

Astronomy & Astrophysics, Volume 645 (2021)

Method to observe Jupiter's radio emissions at high resolution using multiple LOFAR stations: a first case study of the Io-decametric emission using the Irish IE613, French FR606, and German DE604 stations

Louis, Corentin K. ; Jackman, Caitriona M. ; Griessmeier, Jean-Mathias ; Wucknitz, Olaf ; McKenna, David J. ; **Murphy, Pearse** ; Gallagher, Peter T. ; Carley, Eoin ; Fionnagáin, Dúalta Ó ; Golden, Aaron ; McCauley, Joe ; Callanan, Paul ; Redman, Matt ; Vocks, Christian

Royal Astronomical Society Techniques and Instruments, Volume 1 (2022)

LOFAR Imaging of the Solar Corona during the 2015 March 20 Solar Eclipse

Ryan, A. M. ; Gallagher, P. T. ; Carley, E. P. ; Brentjens, M. A. ; **Murphy, P. C.** ; Vocks, C. ; Morosan, D. E. ; Reid, H. ; Magdalenic, J. ; Breitling, F. ; Zucca, P. ; Fallows, R. ; Mann, G. ; Kerdraon, A. ; Halfwerk, R.

Astronomy & Astrophysics, Volume 648 (2021)

A Statistical Analysis of the Solar Phenomena Associated with Global EUV Waves

David M. Long, **Pearse C. Murphy**, Georgina Graham, Eoin P. Carley, David Pérez-Suárez

Solar Physics, Volume 292, Issue 185, (2017)

## **PRESENTATIONS**

### **International Workshop on Machine Learning and Computer Vision in Heliophysics**

**Sofia, Bulgaria**

**19th - 21st April 2023**

Automatic recognition of solar radio bursts in NenuFAR observations.

### **STELLAR Space Weather Workshop**

**Virtual**

**12th - 15th July 2021**

LOFAR Single Station Radio Data Analysis Tutorial.

### **I-LOFAR Science and Techniques Workshop**

**I-LOFAR Education Centre, Birr Castle, Co. Offaly, Ireland**

**2nd - 4th March 2020**

Scattering of radio waves in the solar corona.

### **I-LOFAR Science and Techniques Workshop**

**I-LOFAR Education Centre, Birr Castle, Co. Offaly, Ireland**

**2nd - 4th March 2020**

Single Station Data Analysis Tutorial.

### **Irish National Astronomy Meeting**

**Armagh, Northern Ireland**

**4th - 6th September 2019**

Interferometric Imaging of Type III Bursts in the Solar Corona.

### **Young European Radio Astronomers Conference**

**Dublin Institute for Advanced Studies/Trinity College Dublin, Ireland**

**26th - 29th August 2019**

Interferometric Imaging of Type III Bursts in the Solar Corona.

### **Community of European Solar Radio Astronomers Workshop**

**Leibniz-Institut für Astrophysik Potsdam, Germany**

**8th - 12th July 2019**

Interferometric Imaging of Type III Bursts in the Solar Corona.

### **Irish National Astronomy Meeting**

**Birr, Ireland**

**5th - 7th September 2018**

Finding Fast Solar Radio Transients in I-LOFAR Transient Buffer Board Data.