

PEARSE MURPHY

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PROFILE

I am a postdoctoral researcher at Observatoire de Paris where I am developing a machine learning algorithm to automatically detect solar radio emission in [NenuFAR](#) observations.

I completed my PhD at Trinity College Dublin and the Dublin Institute for Advanced Studies (DIAS) under the co-supervision of Prof. Peter Gallagher and Dr. Eoin Carley. My research focused on interferometric radio imaging of solar bursts using the LOw Frequency ARray (LOFAR) in order to study the turbulent nature of the solar corona.

I was also involved in the development of the REALtime Transient Acquisition ([REALTA](#)) backend for recording and processing data from the Irish LOFAR station [I-LOFAR](#) in Birr, County Offaly. I was one of I-LOFAR's Chief Observers and regularly monitored the sun for radio signatures of solar activity.

EDUCATION

Trinity College Dublin, Ireland — PhD. Astrophysics 2017-2022

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

RESEARCH AND TEACHING EXPERIENCE

Postdoctoral Researcher — 2022-Present

I use TensorFlow and other Python libraries to implement a UNET convolutional neural network that can detect the exact time and frequency of solar radio emission in NenuFAR data. I also use NenuFAR to make radio interferometric images of the Sun at the highest spectral resolutions to date.

I-LOFAR Chief Observer — 2017-2022

Responsible for coordinating and running observations on I-LOFAR. This includes recording raw voltages with the REALTA backend or station statistics data with the local control unit. I have overseen the observational programming on I-LOFAR of a number of different radio sources including; solar radio emission, pulsars and jovian radio emission.

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

Responsible for designing and teaching a physics and maths syllabus for the Walton Club, a weekend Science Technology Engineering and Maths (STEM) club for 12-17 year olds.

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

Demonstrated for undergraduate physics laboratories for Junior Sophister (3rd year) students. Involved teaching a breadth of fundamental and applied concepts in physics, as well as experimental techniques and how to operate laboratory equipment.

I-LOFAR Construction Team Member, Birr — 2017

During the summer of 2017 I was part of a team of undergraduates, postgraduates, postdoctoral researchers and senior academic staff who constructed I-LOFAR. This involved the assembly of 96 high band antenna tiles and 96 low band antennas and connecting them to the station electronics.

Final Year Undergraduate Research Project, Mullard Space Science Laboratory, University College London — 2016

Completed a nine week research project on A Statistical Analysis of “EIT waves” and the Solar Phenomena Associated with them. Compared the velocity of waves in the solar corona with other solar phenomena including solar flares, coronal mass ejections, solar energetic particles and type III radio bursts. The project report was awarded a grade of first class honours.

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Postgraduate research student at the School of Physics Trinity College Dublin and the Astronomy and Astrophysics section of the Dublin Institute for Advanced Studies.

Regular member of the Solar and Space Weather Key Science Project of the international LOFAR telescope.

Fellow of the Royal Astronomical Society.

Member of the Astronomical Society of Ireland.

AWARDS AND SCHOLARSHIPS

Recipient of the Irish Research Council Government of Ireland
Postgraduate Scholarship.

Awarded gold medal for exceptional merit in final year undergraduate
exams.

PUBLICATIONS

First Results from the REAL-time Transient Acquisition (REALTA) backend at
the Irish LOFAR station. **Pearse C. Murphy** et al. Astronomy & Astrophysics
Astronomy & Astrophysics, Volume 655, 2021

LOFAR observations of radio burst source sizes and scattering in the solar
corona. **Murphy, Pearse C.** ; Carley, Eoin P. ; Ryan, Aoife Maria ; Zucca,
Pietro ; Gallagher, Peter T. Astronomy & Astrophysics, Volume 645, 2021.

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. Long, D. M. ; **Murphy, P.** ; Graham, G. ; Carley, E. P. ; Pérez-Suárez,
D. Solar Physics, Volume 292, Issue 12, 2017.

TALKS AND 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.

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.

SKILLS

Research

Interferometric radio imaging e.g. LOFAR Default Processing Pipeline, WSClean.

Oral and written communication.

Data visualisation e.g. matplotlib.

Data modelling e.g. Non-linear least squared fitting with scipy and lmfit.

Version control, e.g. git

Computer Languages

Python, Bash.

Operating Systems

Mac OSX, Linux Ubuntu, Windows 10.

Other

Irish driver's licence, English as a first language.

PERSONAL INTERESTS

Cycling, bouldering, musical theatre, singing.