

# David O’Ryan

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## Professional Summary

- Principal interests: galaxy evolution, galaxy interaction, galactic magnetism, star formation in interacting galaxies, automated galaxy classification, citizen science, astronomy with machine learning, data science, climate impact of astronomy and cultural astronomy.
- Expert in numerical simulations with Bayesian statistics.
- Expert in combining citizen science with machine learning.
- Expert at large scale data analysis, particularly using the Pandas Python package.
- Active Collaborations: [Galaxy Zoo](#), [Galaxy Zoo: Mergers](#), [LSST](#), [ESDC Machine Learning Group](#).

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## Education

<b>University of Lancaster</b> <i>PhD in Physics</i>	Oct 2019 – Present <i>Lancaster, UK</i>
<b>University of Glasgow</b> <i>Integrated Masters (MSci) in Physics and Astronomy</i>	Sept 2014 – Jun 2019 <i>Glasgow, UK</i>

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## Research Experience

<b>Archival Researcher</b> <i>European Space Astronomy Centre (ESAC), European Space Agency</i>	Apr 2022 – Jul 2022 <i>Madrid, Spain</i>
<b>Masters Project in Solar Physics</b> <i>University of Glasgow</i>	Sept, 2018 – May 2019 <i>Glasgow, United Kingdom</i>
<b>Summer Research Student in Imaging Concepts</b> <i>University of Glasgow</i>	June 2018 – Aug 2018 <i>Glasgow, United Kingdom</i>
<b>Summer Research Student in Galaxy Evolution</b> <i>University of St Andrews</i>	June 2017 – Aug 2017 <i>St Andrews, United Kingdom</i>
<b>Summer Research Student in Galaxy Evolution</b> <i>Nicolas Copernicus Astronomy Centre</i>	Jul 2016 – Aug 2016 <i>Warsaw, Poland</i>

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## Other Experience

<b>Data Scientist</b> <i>1715Labs</i>	Oct 2021 – Jan 2022 <i>London, United Kingdom</i>
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## Presentations, Invited Talks and Seminars

DOR has given multiple talks across at a range of venues and events, ranging from being an invited speaker contributing a talk at conferences or workshops. The primary ones during his PhD were:

**Dec 2022:** "ESA Datalabs with Pandas - Creating 126 Million Cutouts", ESA Datalabs 2022 Workshop, Invited Speaker, ESAC, Madrid, Spain

<b>Oct 2022:</b>	"Creating a Large Interacting Galaxy Dataset with the ESA Hubble Archive, Galaxy Zoo Labels and Deep Learning", Invited Speaker, University of Lancaster, Lancaster, UK
<b>Aug 2022:</b>	"Creating a Large Interacting Galaxy Dataset with the ESA Hubble Archive, Galaxy Zoo Labels and Deep Learning", Invited Speaker, ESAC, Madrid, Spain
<b>Aug 2021:</b>	"Exploring Galaxy Merger Histories and Their Parameters Using Low Surface Brightness Structure", National Astronomical Meeting, University of Bath, UK
<b>July 2021:</b>	"Exploring Galaxy Merger Histories and Their Parameters Using Low Surface Brightness Structure", European Astronomical Society Annual Meeting, Leiden, Netherlands
<b>Jan 2020:</b>	"Painting Galaxies: A Statistical Framework for Quantifying Galaxy Merger Histories", Durham-Edinburgh Extragalactic Workshop, Durham, UK

### *Outreach*

DOR has been involved in multiple outreach projects throughout his PhD and undergraduate degrees. Some examples of permanent outreach positions he has held are:

<b>Jodrell Bank Volunteer</b>	April 2022 – present
<i>Jodrell Bank</i>	<i>Manchester, UK</i>
<b>Planetarium Presenter</b>	December 2019 – present
<i>Lancaster University Planetarium</i>	<i>Lancaster, UK</i>
<b>Student Open Day Volunteer</b>	Sep 2017 – June 2018
<i>University of Glasgow</i>	<i>Glasgow, UK</i>

Examples of specific outreach events that DOR has volunteered for are:

<b>Sep 2022:</b>	"Newtown Science Festival", Newtown, Wales
<b>Aug 2021:</b>	"End of Summer at Jodrell Bank", Jodrell Bank, Manchester, UK

### *Awards*

<b>Archival Researcher Visitor Program Stipend</b>	Mar 2022
<i>European Space Agency</i>	<i>4,500€</i>
<b>Vacation Bursary</b>	Jun 2018
<i>Engineering and Physical Science Research Council</i>	<i>£2,400</i>
<b>Summer Bursary</b>	May 2017
<i>Royal Astronomical Society</i>	<i>£1,200</i>
<b>Summer Grant</b>	Jun 2016
<i>Polish Academy of Sciences</i>	<i>2,000zł</i>

### *Programming Expertise*

DOR has experience with multiple different programming languages in a range of contexts. A summary of the languages known are: **Python** (Advanced), **MatLab** (Advanced), **Mathematica** (Advanced), **Git** (Advanced), **FORTRAN** (Intermediate), **C** (Basic).

<b>Python:</b>	Used in the context of galactic simulations, Markov-Chain Monte Carlo (EMCEE, Zeus), large dataset exploration (Pandas, Numpy), geospatial data examination (Shapely, GeoPandas), Bayesian statistics (corner, scipy, scikit-learn), simulation based inference (sbi) and machine learning (TensorFlow).
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<b>MatLab:</b>	Was taught in DORs undergraduate degree at the University of Glasgow. Used in the context of solar physics modelling solar prominences and flux distributions.
<b>Mathematica:</b>	Self-taught. Used for data analysis of results from large, hydrodynamic simulations of galaxies in isolation.
<b>Git:</b>	Used for all code backup and version control. Taught at numerous levels of academic career, and used on a daily basis. Also used in an industry context when working for 1715Labs.
<b>FORTTRAN:</b>	Used in the context of galaxy simulations and solar prominence modelling. Simulation code often translated from FORTRAN to Python for later use in career by DOR.
<b>C:</b>	Self-taught. Used in the context of numerical simulations.

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### Teaching

DOR has been a teaching assistant for multiple courses at the University of Lancaster. These include:

- 1<sup>st</sup> year tutorials for **Waves & Oscillations** course
- 2<sup>nd</sup> year **laboratory experiments** focused on stellar types and properties.

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### Scientific Publications

#### Publications as Lead Author

*Note: candidate name in bold*

2. "Harnessing the Hubble Space Telescope Archives: A Catalogue of 21,926 Interacting Galaxies", **D. O’Ryan**, et al. (16 authors), Submitted to ApJ, Submitted Manuscript: [Link](#)
1. "Advanced PySPAM: Constraining Galaxy Interaction in a Statistical Manner", **D. O’Ryan** & B. D. Simmons, In Prep., Link to In Prep Manuscript: [Link](#)

#### Publications as Major Contributing Author

1. "Origin of the Local Group Satellite Planes", I. Banik, **D. O’Ryan**, H. Zhao, 2018, *MNRAS*, 477, pp 4768–4791

#### Publications as Associate Author

4. "Galaxy and Mass Assembly: Galaxy Morphology in the Green Valley, Prominent Rings, and Looser Spiral Arms", D. Smith *et al.* (**O’Ryan**: 17<sup>th</sup> of 18 authors), 2022, *MNRAS*, 517, pp. 4575–4589
3. "Preparing for Low Surface Brightness Science with the Vera C. Rubin Observatory: Characterization of Tidal Features from Mock Images", G. Martin *et al.* (**O’Ryan**: 20<sup>th</sup> of 52 authors), 2022, *MNRAS*, 513, pp. 1459–1487
2. "Gems of the Galaxy Zoos-A Wide-ranging Hubble Space Telescope Gal-filler Program", W. Keel *et al.* (**O’Ryan**: 16<sup>th</sup> of 16 authors), 2022, *AJ*, 163, pp. 150
1. "Quantifying the Poor Purity and Completeness of Morphological Samples Selected by Galaxy Colour", R. J. Smethurst *et al.* (**O’Ryan**: 9<sup>th</sup> of 10 authors), 2022, *MNRAS*, 510, pp. 4126–4133