

# Ciaran A. J. O'Hare

## Curriculum Vitae

School of Physics, University of Sydney  
Physics Rd, Camperdown NSW 2006, Australia

✉ [ciaran.aj.ohare@gmail.com](mailto:ciaran.aj.ohare@gmail.com)

📄 [cajoha.re](http://cajoha.re)

🐦 [cajohare](https://twitter.com/cajohare)

🌐 [cajohare](https://cajohare)

## Academic history

- 2022– **ARC DECRA Fellow**, *School of Physics*, University of Sydney, Australia.  
Grant: \$430.1k, “*Unmasking dark matter: from the laboratory to the Milky Way*”, sole investigator
- 2022– **Associate Investigator**, *ARC Centre of Excellence for Dark Matter Particle Physics*.
- 2019–2021 **Postdoctoral Research Associate**, *School of Physics*, University of Sydney, Australia.  
Supervisor: Celine Boehm
- 2017–2019 **Postdoctoral Researcher**, *Departamento de Física Teórica*, Universidad de Zaragoza, España.  
Supervisor: Javier Redondo

## Education

- 2013–2017 **PhD Physics**, *Particle Cosmology group*, University of Nottingham, United Kingdom.  
Supervisor: Anne Green  
Thesis: [WIMPs, neutrinos and axions in the next generation of dark matter experiment](#)
- 2009–2013 **MSci Physics**, University of Nottingham, (average: 92%, ranked joint 1st in cohort).  
Supervisor: Adam Moss  
Thesis: [Dynamics of domain wall systems](#)

## Academic and community service roles

2023  
2024

### Member of the Particle Data Group (PDG).

Role includes encoding new particle data listings for the section on axions and similar particles

2023

### Lead organiser, 8th CYGNUS Workshop on Directional Recoil Detection.

<https://indico.cern.ch/e/cygnus2023>.

2023

### Member of COST Action (CA21106) ‘Cosmic Wispers’.

WG2 (WISP cosmology) and WG4 (direct detection)

2022  
2023

### Recruitment for astroparticle group faculty hires, University of Sydney.

I surveyed suitable applicants for two female-only faculty positions in astroparticle physics, and assisted Prof. Boehm in recruiting them.

2022  
2023

### Institutional board member, CYGNUS-Oz collaboration.

The institutional board for CYGNUS-Oz has one member from each institution (ANU, Melbourne, Adelaide, Sydney), who oversee decision-making.

2022  
2023

### Panelist for grant-writing workshop, University of Sydney.

Advice sessions run by Faculty of Science

2022

### Panel member for the Sydney Scholar Awards.

Assessing awardees of [undergraduate scholarships](#) for the Faculty of Science

2022

### Local organising committee, Sydney Spring Summer School, University of Sydney.

<https://indico.cern.ch/event/1157732/>.

2022

### Local organising committee, Dark Side of the Universe Conference, UNSW.

<https://indico.cern.ch/event/1107937/>.

2022

### International advisory committee, International Dark Matter conference, Vienna, Austria.

<https://indico.cern.ch/event/922783/>.

2022

### Postdoctoral Research Associate selection panel, University of Sydney.

I helped to recruit applicants for a postdoctoral position funded by the Dark Matter CoE, conducted interviews, and sat on the selection panel.

2021  
2022

### Snowmass '21, white paper convener, USA Research institutions.

Instrumentation Frontier (IF5-WP3): Recoil imaging with micro-pattern gas detectors

2021  
2022

### **Mentor for Science Extension program, High Schools in NSW.**

I participated as one of USyd's academics assisting with the NSW [Science Extension course](#), where researchers are partnered with high-school students to assist them in a special research project for their HSC.

2020  
2023

### **Member of of the School of Physics Colloquium Working Group, University of Sydney.**

Speaker invitations, hosting and organising

2020  
2023

### **External member of PhD student thesis panel, Australian National University.**

Lachlan Mckie

2020  
2023

### **Sydney CPPC Weekly seminar organiser.**

Co-organiser for a series of weekly online seminars. My roles include inviting speakers, hosting and recording the seminars, and maintaining the [YouTube channel](#)—which hosts now over 120 recorded seminars.

2020  
2022

### **Dark Chatter.**

Host and organiser of a [web-series](#) for the promotion of early career researchers.

2021

### **PDG Review.**

Supplied all six original figures for the chapter “Axions and other similar particles” in the 2021 [Particle Data Group \(PDG\) review of particle physics](#).

2019  
2023

### **USyd Astroparticle Journal Club organiser.**

I have been the sole organiser of a journal club for the USyd astroparticle group, which has met every week for almost four years.

2019  
2023

### **USyd Astroparticle Group Website.**

I created and maintain the [institutional website](#) for Prof. Boehm's astroparticle group.

2020

### **International advisory committee, International Dark Matter conference, Vienna, Austria.**

<http://idm2020.hephy.at/>.

2018

### **Local organising committee, 4th MADMAX Collaboration Meeting, Zaragoza, Spain.**

<https://indico.mpp.mpg.de/event/6018/overview>.

2018

### **Local organising committee, Probing the dark universe synergies workshop, Zaragoza, Spain.**

<https://riastronomia.es/en/probing-the-dark-universe-oaj-lsc-synergies/>.

2015  
2023

### **Journal referee.**

Journal of Cosmology and Astroparticle Physics, Physical Review Letters, Physical Review D, Astronomy & Astrophysics, SciPost Physics, European Physics Journal C

## Teaching and Supervision

In my four years at USyd, I have formally supervised 1 PhD student, 3 honours students, and 49 undergraduates in research projects.

2024

### **PHYS4122: Astrophysics and Space Science.**

9 hrs lectures for 4th-year/honours-level course

2022  
2023

### **Lead supervisor (PhD).**

Maria-Chiara Lisotti

2022  
2024

### **OLET1640: Astronomy, from the Big Bang to Darkness.**

20 hrs teaching load per semester, online/hybrid material maintenance, setting tutorial questions and exam

2023

### **ARC Dark Matter Centre Vacation Studentship.**

Host for a finishing 4th year BSc(Hons) undergraduate who was awarded a competitive scholarship from the Dark Matter CoE.

2023

### **Summer internship.**

A 1st-year undergraduate sought me out for a summer project after watching a lecture I gave to her cohort on dark matter.

2023

### **PHYS3888: Interdisciplinary Research Project.**

I co-supervised three undergraduates in a semester-long project on DNA as a particle detector in collaboration with the School of Engineering.

2021  
2023

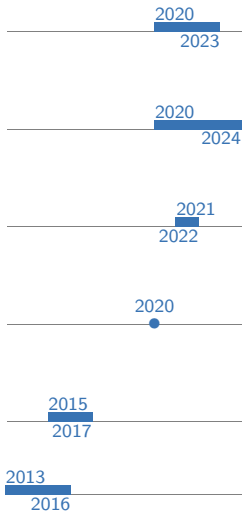
### **SCDL1991: Dalyell Showcase.**

Research project for advanced 1st-year Science students. I have taken on 16 students in total across three years, in groups of 5–6.

2020  
2023

### **PHYS2921: Physics Special Studies Program.**

Semester-long projects for advanced-stream physics students. I have taken on 26 students across three years, in groups of 1–2.



### SCDL3991: Dalyell Individual Research.

Semester-long projects for advanced 2nd and 3rd-year students. Students are required to seek out academics they want to work with for projects. I have taken 4 students across 3 years.

### Physics Honours.

Five 4th-year BSc(Hons) students total as lead supervisor. I also contribute to the thesis and presentation marking for the particle physics cohort.

### Dark Matter Lecture Series.

I initiated a 10-part lecture series for graduate students in the Centre of Excellence. I organised the course and developed material for the lectures, including jupyter notebooks for worked examples.

### High school student work experience.

A high-school student sought me out to come and visit the astroparticle group and work on a short project as part of her HSC year 12 work experience.

### MSci final-year project, University of Nottingham.

Co-supervision of four MSci Physics students across two years.

### 2nd-year core physics workshops, University of Nottingham,

Approximately 3 hr/wk of workshop instruction in four 2nd year Physics courses.

- Quantum mechanics
- Thermal Physics and Statistical Mechanics
- Vector calculus and electromagnetism
- Optics and Fourier analysis

## Media

### Articles written



**CERN Courier**, *Astroparticle physicists head down under* .

<https://cerncourier.com/a/astroparticle-physicists-head-down-under/>

### Media coverage



**COSMOS magazine**, *Dark matter physicists converge on Sydney to try and solve the 'neutrino problem'* .

<https://cosmosmagazine.com/science/dark-matter-sydney-neutrino-problem-cygnus/>



**New Scientist**, *DNA-based detector could precisely track subatomic particles.*

<https://www.newscientist.com/article/2316360-dna-based-detector-could-precisely-track-subatomic-particles/>



**American Physical Society News**, *Redefining How Neutrinos Impede Dark Matter Searches.*

<https://physics.aps.org/articles/v14/s154>



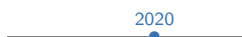
**Centre of Excellence for Dark Matter Particle Physics**, *Meet the researcher.*

<https://www.centredarkmatter.org/all-posts/meet-the-researcher-ciaran-ohare-htrjn-mjf82>



**Discover magazine**, *How DNA can help in the search for dark matter* .

<https://www.discovermagazine.com/the-sciences/how-dna-can-help-the-search-for-dark-matter>



**AstroBites**, *MACHOs Find a New Weight Class to Compete In* .

<https://astrobites.org/2020/09/08/machos-weight-class/>

My publication *O'Hare et al. 2018* was covered by 49 media outlets in 2018.

Altmetric score of 495 (top 5% of all research outputs): <https://aps.altmetric.com/details/45496963>



**CNN**, *A dark matter hurricane is headed our way [sic].*

<https://edition.cnn.com/2018/11/19/opinions/dark-matter-hurricane-headed-our-way-lincoln-opinion/index.html>



**Astronomy magazine**, *A 'dark matter hurricane' is storming past Earth* .

<http://www.astronomy.com/news/2018/11/a-dark-matter-hurricane-is-storming-past-earth>



**Cosmos magazine**, *Researchers brace for dark matter 'hurricane'* .

<https://cosmosmagazine.com/space/researchers-brace-for-dark-matter-hurricane>



**CNET**, *Scientists predict a 'dark matter hurricane' will collide [sic] with the Earth* .

<https://www.cnet.com/news/scientists-predict-a-dark-matter-hurricane-will-collide-with-the-earth/>



**Discover Magazine**, *A 'Dark Matter Hurricane'* .

<http://blogs.discovermagazine.com/d-brief/2018/11/12/dark-matter-hurricane/>



**Gizmodo Magazine**, *So What's Going on With That 'Hurricane of Dark Matter?'* .

<https://gizmodo.com/so-whats-going-on-with-that-hurricane-of-dark-matter-1830420899>

## Outreach

### Aimed at the public

2024 ● **Raising the Bar**, *Sydney CBD*.  
Public lecture on dark matter

2024 ● **MacArthur Astronomy Forum**, *Western Sydney University*.  
Public lecture on astroparticle physics

2023 ● **Dark matter day**, *Australian National University, Canberra*.  
Organisation and giving a public lecture

2023 ● **Quantum–dark matter roadtrip**, *Nationwide, Australia*.  
Organisation and speaking roles for U. Sydney events.

2023 ● **ABC Elevator pitch (web-series)**, *Sydney, Australia*.  
'Antimatter'

2020  
2022 ● **Dark Matter Day**, *U. Sydney*.  
Organiser, speaker and panel member for an annual series of events organised as part of the worldwide Dark Matter Day (31st October)

2018 ● **Science Slam**, *DESY, Hamburg*.  
'On safari in the Milky Way'

2017 ● **Pint of Science Festival**, *Bunkers Hill pub, Nottingham*.  
'The Cosmic Pint'

2017 ● **Guest lecture**, *Manchester Astronomy Society*.  
'The Dark Side'

2015 ● **TEDxUoN talk**, *Portland Building, Nottingham*.  
'Detecting Dark Matter'

2015 ● **Pub.hD talk**, *Vat and Fiddle pub, Nottingham*.  
'Detecting Dark Matter'

### Aimed at students

2021 ● **PhySoc guest lecture**, *University of Sydney*.  
Lecture on 'Dark matter' aimed at Sydney undergraduates

2020 ● **Sydney Physics Dialogues**, *University of Sydney*.  
Lecture on 'Dark matter' aimed at international undergraduates

2018 ● **School visit**, *Colegio Nuestra Señora del Pilar, Zaragoza*.  
Aimed at 14-16 year old science and english students.

2017 ● **School visit**, *Chilwell school, Nottinghamshire*.  
Aimed at students thinking of studying physics at university.

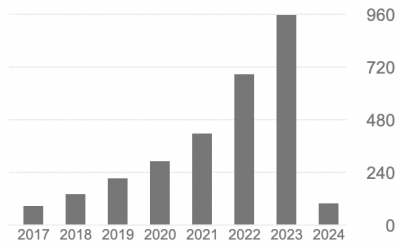
2014  
2017 ● **Ambition Nottingham**.  
A series of programs at UoN aimed at local students from backgrounds under-represented at universities in the UK. I was heavily involved in the physics and astronomy 'course tasters' for the scheme as both an organiser and a lecturer.

2013  
2017 ● **University of Nottingham open days**.  
My roles involved guiding visitors around the School of Physics and giving information on research programs, undergraduate and postgraduate courses. I also ran drop-in sessions and demonstrations for the Particle Cosmology group.

I upload slides and other material related to my outreach at <https://cajoha.re/outreach>

## Publications

	All	Since 2019
Citations	2951	2676
h-index	28	26
i10-index	34	34



Citation counts: 2951 ([Google Scholar](#)), 2966 ([inspireHEP](#))

- Boutan et al. 2023 **44.** [‘Axions beyond Gen-2’](#)  
C. Boutan et al.,  
International Journal of Modern Physics A **38**, 33n34, 2330012 (2023)
- Carew et al. 2023 **43.** [‘The neutrino fog for dark matter-electron scattering experiments’](#)  
B. Carew, A. R. Caddell, T. N. Maity, C. A. J. O’Hare  
Submitted to PRD
- O’Hare et al. 2023b **42.** [‘Axion minicluster streams in the solar neighbourhood’](#)  
C. A. J. O’Hare, G. Pierobon, J. Redondo  
Submitted to PRL
- O’Hare et al. 2023a **41.** [‘The spin axes of globular clusters and correlations with gamma-ray emission’](#)  
C. A. J. O’Hare, A. Krone-Martins, C. Boehm, R. Crocker  
Submitted to OJA
- Antel et al. 2023 **40.** [‘Feebly Interacting Particles: FIPs 2022 workshop report’](#)  
C. Antel et al. (Contributed 4 figures + summary table and references)
- McAllister et al. 2023 **39.** [‘Limits on dark photons, scalars, and axion-electromagnetodynamics with the ORGAN experiment’](#)  
B. T. McAllister, A. Quiskamp, C. A. J. O’Hare, P. Altin, M. Goryachev, M. E. Tobar  
Annalen der Physik 2023, 2200622
- Eggemeier et al. 2023 **38.** [‘Axion minivoids and implications for direct detection’](#)  
B. Eggemeier, C. A. J. O’Hare, G. Pierobon, J. Redondo, Y. Y. Y. Wong  
Phys. Rev. D **107** (2023) 8, 083510
- Cooley et al. 2022 **37.** [‘Report of the Topical Group on Particle Dark Matter for Snowmass 2021’](#)  
J. Cooley et al.  
Snowmass 2021 Cosmic Frontier report
- Surrow et al. 2022 **36.** [‘Micro-pattern gaseous detectors’](#)  
M. Surrow et al.  
Snowmass 2021 Instrumentation Frontier IF5 Summary Report
- Adams et al. 2022 **35.** [‘Axion dark matter’](#)  
C. Adams et al.  
Snowmass 2021 Cosmic Frontier White Paper (Contributed 3 figures)
- Antybas et al. 2022 **34.** [‘New Horizons: Scalar and Vector Dark Matter’](#)  
D. Antybas et al.  
Snowmass 2021 Cosmic Frontier White Paper (Contributed ~2000 words and 1 figure)
- Akerib et al. 2022 **33.** [‘Dark Matter Direct Detection to the Neutrino Fog’](#)  
D. Akerib et al.  
Snowmass 2021 Cosmic Frontier White Paper (Contributed 2000 words and 2 figures)

- Abdullah et al. 2022 **32.** 'Coherent elastic neutrino-nucleus scattering: Terrestrial and astrophysical applications'  
Abdullah et al.  
Snowmass 2021 Neutrino Frontier White Paper (Contributed ~1000 words and 1 figure)
- O'Hare et al. 2022b **31.** 'Recoil imaging for dark matter, neutrinos, and beyond the Standard Model physics'  
C.A.J. O'Hare et al.  
Snowmass 2021 Instrumentation Frontier White Paper (Coordinator, and lead author)
- Aalbers et al. 2022 **30.** 'A Next-Generation Liquid Xenon Observatory for Dark Matter and Neutrino Physics'  
J. Aalbers et al.  
Accepted by J. Phys. G (Contributed ~1000 words and 1 figure)
- O'Hare et al. 2022a **29.** 'Simulations of axion-like particles in the post-inflationary scenario'  
C.A.J. O'Hare, G. Pierobon, J. Redondo, Y.Y.Y. Wong  
Phys. Rev. D **105** 055025 (2022)  
[Animations on YouTube]
- Chen et al. 2021b **28.** 'Cosmology of the companion-axion model: dark matter, gravitational waves, and primordial black holes'  
Z. Chen, A. Kobakhidze, C.A.J. O'Hare, Z.S.C. Picker, G. Pierobon  
arXiv:2110.11014  
[Github page: <https://github.com/cajohare/CompAxion>]
- Chen et al. 2021a **27.** 'Phenomenology of the companion-axion model: photon couplings'  
Z. Chen, A. Kobakhidze, C.A.J. O'Hare, Z.S.C. Picker, G. Pierobon  
Eur. Phys. J. C **82** (2022) 940  
[Github page: <https://github.com/cajohare/CompAxion>]
- O'Hare 2021 **26.** 'Fog on the horizon: a new definition of the neutrino floor for direct dark matter searches'  
C. A. J. O'Hare  
Phys. Rev. Lett. **127**, 251802 (2021) (Editor's suggestion and featured article)  
[Github page: <https://github.com/cajohare/NeutrinoFog>]
- Boehm et al. 2021b **25.** 'Comment on: Cosmological black holes are not described by the Thakurta metric'  
C. Boehm, A. Kobakhidze, C. A. J. O'Hare, Z. S. C. Picker, M. Sakellariadou  
arXiv:[2105.14908]
- O'Hare et al. 2021a **24.** 'Particle detection and tracking with DNA'  
C. A. J. O'Hare, Vassili G. Matsos, Joseph Newton, Karl Smith, Joel Hochstetter, Ravi Jaiswar, Wunna Kyaw, Aimee McNamara, Zdenka Kuncic, Sushma Nagaraja Grellscheid, and Céline Boehm  
Eur. Phys. J. C, **82** 4 (2022) 306
- Caputo et al. 2021 **23.** 'Dark photon limits: a cookbook'  
A. Caputo, A. Millar, C. A. J. O'Hare, E. Vitagliano  
Phys. Rev. D **104**, 095029 (2021)  
[Github page: <https://github.com/cajohare/DarkPhotonCookbook>]
- Vahsen et al. 2021 **22.** 'Directional recoil detection'  
S. Vahsen, C. A. J. O'Hare, D. Loomba  
Annu. Rev. Nucl. Part. Sci. **71** 189–224 (2021)
- O'Hare & Vitagliano 2020 **21.** 'Cornering the axion with  $CP$ -violating interactions'  
C. A. J. O'Hare, E. Vitagliano  
Phys. Rev. D **102**, 115026 (2020)  
[Github page: <http://cajohare.github.io/AxionLimits>]
- Vahsen et al. 2020 **20.** 'CYGNUS: Feasibility of a nuclear recoil observatory with directional sensitivity to dark matter and neutrinos'  
S. Vahsen, C. A. J. O'Hare et al. (2020)
- Boehm et al. 2021a **19.** 'Eliminating the LIGO bounds on primordial black hole dark matter'  
C. Boehm, A. Kobakhidze, C. A. J. O'Hare, Z. S. C. Picker, M. Sakellariadou  
JCAP **03** 078 (2021)
- O'Hare et al. 2020b **18.** 'Axion helioscopes as solar magnetometers'  
C. A. J. O'Hare, A. Caputo, A. J. Millar, E. Vitagliano  
Phys. Rev. D **102**, 043019 (2020)  
[Github page: <http://cajohare.github.io/solax>]

- O'Hare 2020 **17.** 'Can we overcome the neutrino floor at high masses?'  
C. A. J. O'Hare  
Phys. Rev. D **102**, 063024 (2020)  
[Github page: <http://github.com/cajohare/AtmNuFloor>]
- O'Hare et al. 2020a **16.** 'Dark Shards: velocity substructure from *Gaia* and direct searches for dark matter'  
C. A. J. O'Hare, N. W. Evans, C. McCabe, G. Myeong, V. Belokurov  
Phys. Rev. D **101** (2020) no.2, 023006  
[Github page: <http://cajohare.github.io/DarkShards>]
- Dafni et al. 2019 **15.** 'Weighing the Solar Axion'  
T. Dafni, C. A. J. O'Hare, J. Galán, I. G. Irastorza, F. J. Iguaz, K. Jakovčić, B. Lakić, G. Luzón, J. Redondo, E. Ruiz Chóliz  
Phys. Rev. D **99** 035037 (2019)  
[Github page: <http://cajohare.github.io/IAx0mass>]
- Evans et al. 2019 **14.** 'SHM<sup>++</sup>: A refinement of the Standard Halo Model for dark matter searches'  
N. W. Evans, C. A. J. O'Hare, C. McCabe  
Phys. Rev. D **99**, 023012 (2019)
- O'Hare et al. 2018 **13.** 'A dark matter hurricane: measuring the S1 stream with dark matter detectors'  
C. A. J. O'Hare, C. McCabe, N. W. Evans, G. Myeong, V. Belokurov  
Phys. Rev. D **98**, 103006 (2018) (featured article)
- Knirck et al. 2018 **12.** 'Directional axion detection'  
S. Knirck, A. Millar, C. A. J. O'Hare, J. Redondo, F. Steffen  
JCAP **11** 051 (2018)
- O'Hare & Burrage 2018 **11.** 'Stellar kinematics from the symmetron fifth force in the Milky Way disk'  
C. A. J. O'Hare & C. Burrage  
Phys. Rev. D **98** 064019 (2018)
- O'Hare 2017 **10.** 'Terrestrial WIMP/Axion astronomy'  
C. A. J. O'Hare  
Contributed to the 13th Patras Workshop on Axions, WIMPs and WISPs, Thessaloniki
- O'Hare et al. 2017 **9.** 'Time-integrated directional detection of dark matter'  
C. A. J. O'Hare, B. J. Kavanagh, A. M. Green  
Phys. Rev. D **96**, 083011 (2017)
- Battaglieri et al. 2017 **8.** 'US Cosmic Visions: New Ideas in Dark Matter 2017: Community Report'  
M. Battaglieri et al., FERMILAB-CONF-17-282-AE-PPD-T (2017)
- O'Hare & Green 2017 **7.** 'Axion astronomy with microwave cavity experiments'  
C. A. J. O'Hare & A. M. Green  
Phys. Rev. D **95** 063017 (2017)
- Kavanagh & O'Hare 2017 **6.** 'Reconstructing the three-dimensional local dark matter velocity distribution'  
B. J. Kavanagh & C. A. J. O'Hare  
Phys. Rev. D **94**, 123009 (2016)
- O'Hare 2016 **5.** 'Dark matter astrophysical uncertainties and the neutrino floor'  
C. A. J. O'Hare  
Phys. Rev. D **94**, 063527 (2016)
- Mayet et al. 2016 **4.** 'A review of the discovery reach of directional Dark Matter detection'  
F. Mayet, A. M. Green, J. B. R. Battat, J. Billard, N. Bozorgnia, G. B. Gelmini, P. Gondolo, B. J. Kavanagh, S. K. Lee, D. Loomba, J. Monroe, B. Morgan, C. A. J. O'Hare, A. H. G. Peter  
Physics Reports **627** (2016) 1 (highlighted article)
- O'Hare 2017 **3.** 'Theoretical prospects for directional WIMP detection'  
C. A. J. O'Hare  
Contributed to the 11th Patras Workshop on Axions, WIMPs and WISPs, Zaragoza
- O'Hare et al. 2015 **2.** 'Readout strategies for directional detection beyond the neutrino background'  
C. A. J. O'Hare, A. M. Green, J. Billard, E. Figueroa-Feliciano, L. E. Strigari  
Phys. Rev. D **92**, 063518 (2015)
- O'Hare & Green 2014 **1.** 'Directional detection of dark matter streams'  
C. A. J. O'Hare & A. M. Green  
Phys. Rev. D **90**, 123511 (2014)



---

## Code

2023

### **HowToMakeAPlot.**

Tutorials and tips for making effective figures for papers and talks in physics using Matplotlib

2021

### **CompAxion.**

Python notebooks for calculating model parameters and constraints for the “companion axion” model.

2021

### **NeutrinoFog.**

Code for the neutrino floor/fog for direct dark matter searches

2021

### **DarkPhotonCookbook.**

Code for accounting for daily modulation effects in direct searches for dark photons

2020

### **AxionLimits.**

Highly cited library of astrophysical, cosmological and experimental constraints on axions and axion-like particles

[DOI: 10.5281/zenodo.3932430, Citations: 235]

2020

### **solax.**

Likelihood-based data analysis code for axion helioscopes such as IAXO. Includes precise solar axion flux calculations which account for the solar magnetic field.

2020

### **AtmNuFloor.**

Code for calculating the neutrino floor to direct dark matter experiments. It also allows for the inclusion of time, target and direction dependent methods for overcoming the neutrino floor.

2019

### **DarkShards.**

Code for analysing *Gaia* data to fit velocity and action-space substructures, as well as generate their corresponding signals in dark matter experiments.

2019

### **IAXOmass.**

Likelihood analysis code for the next-generation axion helioscope IAXO.

---

## Talks and presentations

Slides for the majority of my talks are available online at [cajoha.re/talks](http://cajoha.re/talks).

### Colloquia, lectures, and invited seminars

2024

**UCLA Seminar**, *Axions in the solar neighbourhood*.

2023

**HEP Journal club, U. Hawaii**, *The neutrino fog*.

2023

**NTHU Seminar, Taiwan**, *Axion dark matter in the solar neighbourhood*.

2023

**CDMPP ECR Workshop, Adelaide**, *How to make a plot (Lecture+python tutorial)*.

2023

**COST ‘Cosmic Wispers’ School on Axions, Lecce, Italy**, *Axion cosmology (3 lectures+tutorials)*.

2023

**The 27th International Summer Institute on Phenomenology of Elementary Particle Physics and Cosmology, Taiwan**, *‘Dark matter’ (4 lectures)*.

2023

**6th Sydney-CPPC meeting**, *‘Dark matter detection’ (2 lectures)*.

2023

**UNSW Physics Colloquium**, *‘Existential crises in direct dark matter detection’*.

2023

**Sydney Institute for Astronomy Seminar**, *‘Dark matter in the Milky Way’*.

2022

**Swinburne Institute of Technology Colloquium**, *‘New discoveries from Gaia and direct dark matter searches’*.

2022

**UC Santa Barbara**, *‘Recoil imaging for dark matter, neutrinos, and BSM physics’*.

2022

**University of Hawaii**, *‘Axions as dark matter’*.

2022

**Sydney-UNSW Colloquium**, *‘Searching for dark particles across disciplines’*.

2022

**Indian Institute of Technology, Mumbai**, *‘New discoveries from Gaia and direct dark matter searches’*.

2022

**University of New Mexico**, *‘Venturing into the neutrino fog’*.

2022

**Northwestern University**, *‘Venturing into the neutrino fog’*.

2021

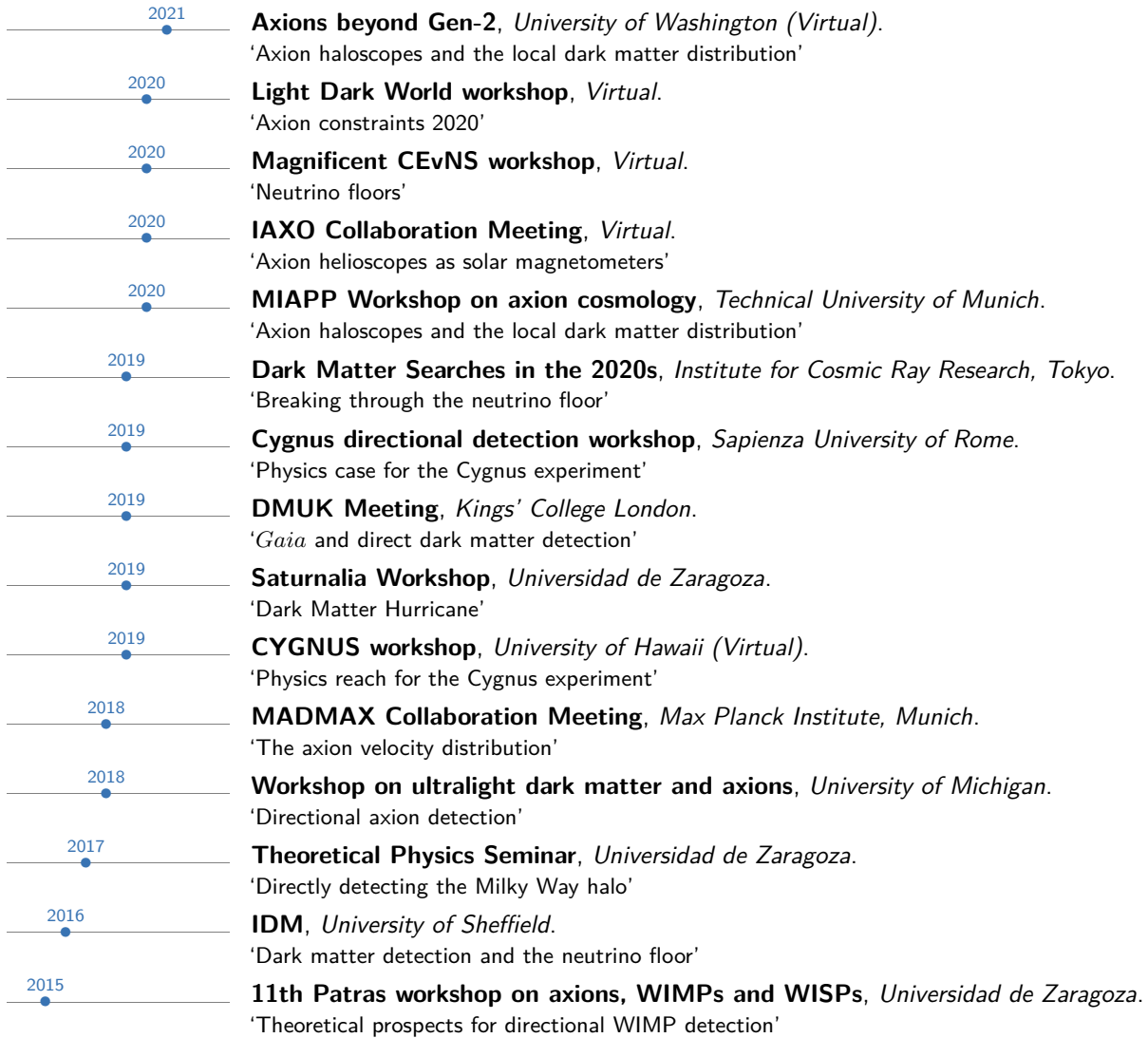
**Georg-August-Universität Göttingen**, *‘Venturing into the neutrino fog’*.



- 2021 **UC San Diego**, '*ALPs to Axions: dark matter in the post-inflationary scenario*'.
- 2021 **University of Nottingham**, '*Axions as dark matter*'.
- 2021 **Tsung-Dao Lee Institute**, '*Venturing into the neutrino fog*'.
- 2021 **Nanjing Normal University**, '*Venturing into the neutrino fog*'.
- 2021 **Melbourne University**, '*Venturing into the neutrino fog*'.
- 2021 **SLAC**, '*The status and future of directional recoil detection*'.
- 2021 **Fermilab**, '*Directional dark matter detection and the CYGNUS project*'.
- 2021 **UCLA**, '*Directional dark matter detection*'.
- 2021 **Sydney CPPC**, '*Dark matter detection off the beaten path*'.
- 2020 **Australian National University**, '*Directional dark matter detection*'.
- 2019 **University of Barcelona**, '*Axtronomy*'.
- 2019 **University of Sydney**, '*Dark matter detection*'.
- 2019 **IFT, Madrid**, '*Gaia and direct dark matter detection*'.
- 2019 **Laboratori Nazionali di Frascati**, '*Introduction to directional detection*'.
- 2018 **Texas A&M University**, '*How to build an axion observatory*'.
- 2018 **Max Planck Institute, Munich**, '*Axiostromy*'.
- 2017 **King's College London**, '*Directly detecting the Milky Way halo*'.

#### Invited conference & workshop presentations

- 2024 **8th CPPC Meeting, Sydney**.  
Axions in the solar neighbourhood
- 2023 **COST Action 'Cosmic Wispers' 1st General Meeting, Bari, Italy**.  
'Axion cosmology and dark matter'
- 2023 **COST 'Cosmic Wispers' WG4 Monthly Meeting, 'Axion limits'**.
- 2022 **CDMPP Annual Meeting, Geelong, Australia**.  
'Wave-like dark matter'
- 2022 **First International Conference on Axion Physics and Experiment, Virtual**.  
'Axion minivoids'
- 2022 **BREAD Collaboration meeting, Virtual**.  
'The dark matter velocity distribution'
- 2022 **IDM Conference, Vienna, Austria**.  
'Concluding talk'
- 2022 **Snowmass Summer Meeting, Seattle, USA (Virtual)**.  
'IF5: MPGDs for DM, neutrinos and BSM'
- 2022 **International Workshop on Underground Physics, Tokyo, Japan**.  
'Recoil imaging and the CYGNUS experiment'
- 2021 **International Joint Workshop on the SM and Beyond 2021, NTHU, Taiwan**.  
'Searching for the axions, on Earth and in space'
- 2021 **Theory Workshop, DESY**.  
'Directional dark matter detection'
- 2021 **ARC CoE for Dark Matter Fortnightly Meeting, Virtual**.  
'Dark photon limits: A cookbook'
- 2021 **Asian Forum for Accelerators and Detectors, Novosibirsk (Virtual)**.  
'Directional dark matter detection and the Cygnus experiment'
- 2021 **ARC CoE for Dark Matter ECR Workshop, Virtual**.  
'The Cygnus experiment'



### Contributed conference & workshop presentations



2016

**TeVPA**, *CERN*.

'Dark matter detection and the neutrino floor'

2016

**LINK'16 Interdisciplinary conference**, *East Midlands Conference Centre*.

'Detecting Dark Matter'

2015

**DMUK**, *University of Liverpool*.

'Directional dark matter detection and the neutrino background'

2014

**BUSSTEPP**, *University of Southampton*.

'Directional detection of dark matter substructure'