

# ELLIS R. OWEN

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*Theoretical Astrophysics Group  $\diamond$  Osaka University*

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## ACADEMIC APPOINTMENTS

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- RIKEN Special Postdoctoral Research Fellow (SPDR)**, Wakō, Saitama, Japan From Dec. 2024  
*Independent institutional fellowship*  
Host researcher: Prof. Shigehiro Nagataki (Astrophysical Big Bang Laboratory)
- JSPS Research Fellow**, Theoretical Astrophysics Group, Osaka University, Japan 2022-2024  
*Independent fellowship*  
Host researcher: Prof. Yoshiyuki Inoue
- CICA Research Fellow**, Institute of Astronomy, National Tsing Hua University, Taiwan 2019-2022  
*Institutional personal fellowship leading an independent research program*  
Host researcher: Prof. Shih-Ping Lai

## EDUCATION

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- PhD in Astrophysics** UCL Mullard Space Science Laboratory, UK 2014-2019  
Thesis: *Hadronic Processes of Energetic Particles in Star-Forming and High-Redshift Protogalactic Environments*  
Supervisor: Prof. Kinwah Wu
- Research Assistant** Max-Planck-Institut für Kernphysik, Germany 2013-2014  
Research: Diffuse  $\gamma$ -ray emission from the Galaxy & CTA analysis software development  
Supervisors: Prof. Werner Hofmann, Dr. Christoph Deil
- MSc in Astrophysics** UCL Department of Physics & Astronomy, UK 2012-2013  
*Graduated with distinction*  
Thesis: *Modified Gravity as an alternative to Dark Energy*  
Supervisors: Prof. Ofer Lahav, Dr. Donnacha Kirk
- BA in Natural Sciences (Astrophysics)** University of Cambridge, UK 2009-2012  
*Graduated with honours (Class II)*
- Postgraduate Diploma in Education** University of Bath, UK (distance learning) 2021-2024  
*Graduated with distinction*  
Topics include: Educational psychology, learners and learning, education in international contexts, assessment, curriculum design, research methods in education and critical self-reflection on teaching/supervision practice

## AWARDS, SCHOLARSHIPS & FELLOWSHIPS

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- RIKEN SPDR Fellowship** 2024  
Value approx. 25M JPY, selection ratio across all science fields  $\sim$  15%
- Selected Candidate: MEXT Leading Initiative for Excellent Young Researchers (LEADER)** 2023  
10M JPY per year for 5 years if matched with tenure-track/permanent employment at a university in Japan
- JSPS Postdoctoral Research Fellowship** 2022  
Value approx. 12M JPY (including Grant-in-Aid of Research), selection ratio across all fields  $\sim$  10%
- NCTS Postdoctoral Paper Prize** 2022  
One of two awards for top postdoctoral research paper, selected across all Physical Science subjects in Taiwan
- UK Science & Technology Facilities Council PhD Scholarship** 2014  
Stipend, research budget and tuition fees for duration of PhD programme (2014-2019)

## COMPETITIVELY AWARDED FUNDING, COMPUTING AND OBSERVING TIME

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**Atacama Large Millimeter/submillimeter Array (ALMA)** Cycle 11 (2024)

*Cosmic ray irradiation of a molecular cloud near a high-energy TeV source*

PI: E. R. Owen; Co-I: S.-P. Lai (National Tsing Hua University), S.-J. Lin (Academia Sinica IAA)

**15.7 hours** in receiver Band 6 and 7 (priority C)

**Atacama Large Millimeter/submillimeter Array (ALMA)** Cycle 11 (2024)

*Cosmic ray ionization and feedback in the HyLIRG F1437+1950*

PI: E. R. Owen; Co-I: T. Michiyama (Shunan University)

**4.0 hours** in receiver Band 8 and 9 (priority C)

**University of Tokyo ICRR Inter-University Research Program** 2023-2024

*Investigating the  $\gamma$ -ray signatures of feedback microphysics in star-forming environments*

**Value: 300k JPY**

PI: E. R. Owen; Co-I: M. Strzys (ICRR, University of Tokyo), Y. Inoue (Osaka University)

**University of Tokyo ICRR Inter-University Research Program** 2020-2024

*Understanding the GeV-TeV signatures of star-forming galaxies in the extra-galactic  $\gamma$ -ray background with CTA*

**Value: 710k JPY**

PI: E. R. Owen; Co-I: A. K.-H. Kong (National Tsing Hua University), M. Teshima (ICRR, University of Tokyo)

**Center for Computational Astrophysics**, National Astronomical Observatory of Japan FY 2023A - 2024A

*Magnetohydrodynamical modeling of feedback and diffuse structures in the high energy  $\gamma$ -ray and neutrino sky*

**364k node hours** on Cray XC50; adoption category XC-B

PI: E. R. Owen

**Cybermedia High Performance Computing Center**, Osaka University 2023-HPC-A02

*Simulating the macroscopic impacts of cosmic ray microphysics in diffuse jet-remnant structures around galaxies*

**190k node hours**

PI: E. R. Owen

**James Clerk Maxwell Telescope (JCMT)** Cycle 2023B

*Mapping magnetic fields of a molecular cloud complex near the high-energy TeV source HESS J1809-193 with POL-2*

**9.3 hours** with SCUBA-2 + POL-2 (weather band 2)

PI: E. R. Owen; Co-I: S.-J. Lin (Academia Sinica IAA), S.-P. Lai (National Tsing Hua University), M. Strzys (ICRR, University of Tokyo), S.-T. Chen (National Tsing Hua University)

**Atacama Large Millimeter/submillimeter Array (ALMA)** Cycle 9 (2022)

*Resolving the feedback action of cosmic rays in distant star-forming galaxies*

**7.0 hours** in receiver Band 6 and 7 (priority B)

PI: E. R. Owen; Co-I: S.-P. Lai (National Tsing Hua University), I. Ferreras (IAC), Q. Han (UCL)

## SCIENTIFIC SERVICE & LEADERSHIP

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### Scientific peer review

- Referee for *Nature Astronomy*, *ApJ*, *MNRAS*, *A&A*, *Astrophysics & Space Science*, *Galaxies*, *Universe*, *Symmetry*, *Astronomy*, *Advances in Space Research*
- Scientific reviewer of postdoctoral research fellowship proposals:
  - (1) Dutch Research Council (NWO), Netherlands
- Observational proposal review:
  - (1) External scientific evaluation reviewer for the JCMT Time Allocation Committee (cycles 24A and 24B)
  - (2) ALMA cycles 8, 9, 10 and 11 distributed review

<b>Guest Co-editor</b> of special issue of the journal <i>Universe Studying Astrophysics with High Energy Cosmic-Particles</i>	2023-2025
<b>Co-chair and convener</b> <i>2nd NCTS/UCAT/NTHU Winter School: Magnetism in star-forming &amp; galactic environments</i> Hybrid online/on-site 1-week international winter school <b>188 participants</b> from 34 countries; budget 400k NT\$	Feb. 2023
<b>Chair and convener</b> <i>1st NTHU/NCTS Winter School: High Energy Astrophysics</i> Hybrid online/on-site 1-week international winter school <b>346 participants</b> from 48 countries; budget 210k NT\$	Jan. 2021
<b>Co-convener and Local Organizer</b> , <i>New Results in X-Ray Astronomy</i> National X-ray astronomy annual meeting 50 attendees from across the UK	Sept. 2019
<b>Local Organizing Committee</b> , <i>New Results in X-Ray Astronomy</i> National X-ray astronomy annual meeting 45 attendees from across the UK	Sept. 2016

## TEACHING, SUPERVISION & MENTORSHIP

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### LECTURING

- Guest lecturer, Osaka University, Graduate School of Science, Japan  
*High Energy Astrophysics*, M.S. Astrophysics program Semester 1, 2023
- Invited lecturer for the NCTS-TCA Summer School Introductory Workshop, online, Taiwan  
*An Introduction to High Energy Astrophysics* July 2022

### STUDENT MENTORING

- Mentoring and research supervision of 3 undergraduate students and 2 MSc students since 2021
- Primary supervisor of 7 summer students since 2017
- Primary supervisor of 2 secondary school summer students since 2016 (Nuffield summer student programme)

## SCIENTIFIC TALKS & PRESENTATIONS

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### Invited Workshop/Conference Talks and lectures

- Invited talk at ‘The extreme Universe viewed in very-high-energy gamma rays 2022’  
ICRR, University of Tokyo, Kashiwa, Japan  
*Exploring the role of cosmic rays in galaxies with high energy signatures* Feb. 2023
- Director’s invited talk at NCTS Post-doctoral research workshop  
National Center for Theoretical Sciences, Taipei, Taiwan  
*Observational signatures of cosmic rays in molecular cloud environments* Feb. 2023
- Invited highlight science talk at the ‘2nd NCTS/UCAT/NTHU International Winter School’  
National Center for Theoretical Sciences (Physics division), Taipei, Taiwan  
*Magnetic fields, cosmic rays and star-formation in evolving galaxy ecosystems* Jan. 2023
- Invited highlight science talk at the ‘1st NCTS/NTHU International Winter School: High Energy Astrophysics’  
National Center for Theoretical Sciences (Physics division), Hsinchu, Taiwan  
*Exploring starburst origins of the extra-galactic gamma-ray background* Jan. 2021
- Invited review talk at the workshop ‘Multiscale Feedback on Galaxy Evolution: From Stellar Explosions to Active Galactic Nuclei’, National Center for Theoretical Sciences (Physics division), Hsinchu, Taiwan  
*Cosmic Rays: The Invisible Hand in Galaxy Evolution* Oct. 2020

## Invited Seminars & Colloquia (previous 3 years)

- Seminar at Graduate School of Engineering, Osaka University, Suita, Japan June. 2024  
*Cosmic rays in astrophysical and cosmological structures*
- Seminar at UCL Mullard Space Science Laboratory, Surrey, UK Mar. 2024  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Astroparticle Physics Colloquium, Norwegian U. of Science and Technology, Trondheim, Norway Mar. 2024  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Colloquium at Ruhr University Bochum Astronomical Institute, Bochum, Germany Mar. 2024  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Seminar at Erlangen Center for Astroparticle Physics, Erlangen, Germany Mar. 2024  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Seminar at the University of Hong Kong, Department of Physics, Hong Kong Mar. 2024  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Colloquium at the Chinese University of Hong Kong, Hong Kong Dec. 2023  
*Cosmic magnetism and its effects on the observed properties of ultra high-energy cosmic rays*
- Astronomical Institute Colloquium at Tohoku University, Sendai, Japan Oct. 2023  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Department of Astronomy Colloquium at the University of Tokyo, Hongo, Tokyo, Japan Sept. 2023  
*Exploring the signatures of cosmic ray feedback effects in galaxy ecosystems*
- Lunchtime seminar at SWIFAR, Yunnan University, PR China Mar. 2023  
*Cosmic magnetism and its effects on the observed properties of ultra high-energy cosmic rays*
- ABBL-iTHEMS joint seminar at RIKEN, Wakō-shi, Saitama, Japan Mar. 2023  
*Cosmic magnetism and its effects on the observed properties of ultra high-energy cosmic rays*
- Seminar at ICRR, University of Tokyo, Kashiwa, Japan Dec. 2022  
*High energy signatures of cosmic rays in and around galaxies*
- Colloquium at National Tsing Hua University, Hsinchu, Taiwan Sept. 2022  
*Cosmic magnetism and the origins of the isotropic ultra high-energy cosmic ray background*
- Colloquium at Chungnam National University, Daejeon, Korea June 2022  
*Cosmic rays in and around star-forming galaxies: observational signatures and physical effects*
- Colloquium at Osaka University, Theoretical Astrophysics Group, Osaka, Japan May 2022  
*The effects and signatures of cosmic rays in star-forming galaxy ecosystems*
- Colloquium at Korea Astronomy and Space Science Institute, Daejeon, Korea April 2022  
*Cosmic rays in and around star-forming galaxies: observational signatures and physical effects*
- Colloquium at the Chinese University of Hong Kong, Hong Kong April 2022  
*Cosmic rays in and around star-forming galaxies: observational signatures and physical effects*
- HEP Seminar at Academia Sinica Institute of Physics, Taipei, Taiwan Mar. 2022  
*The signatures and physical effects of cosmic rays in and around star-forming galaxies*
- Colloquium at LMU Observatory, Munich, Germany Jan. 2022  
*Observational signatures and physical effects of cosmic rays in and around galaxies*
- Colloquium at NAOJ Division of Science, Mitaka, Japan Nov. 2021  
*Cosmic rays as active players in star-formation in and around galaxies*
- Seminar at UCL Mullard Space Science Laboratory, Surrey, UK Oct. 2021  
*Signatures of cosmic ray processes in the high-energy sky*
- Colloquium at NCTS Physics Division, Hsinchu/Taipei & online, Taiwan Oct. 2021  
*The Universe at high energies: cosmic rays as active players in astrophysics*
- Special seminar at Hong Kong University, Hong Kong Oct. 2021  
*Signatures of star-forming galaxies in the gamma-ray background*
- Colloquium at CITA, Toronto, Canada June 2021  
*De-coding signals in the extragalactic gamma-ray background*
- Colloquium at OAA, Florence, Italy Mar. 2021  
*De-coding signals in the extragalactic gamma-ray background*

## Contributed Talks at Conferences (previous 3 years)

- The extreme Universe viewed in very-high-energy gamma rays 2023, Kashiwa, Japan Feb. 2024
- Theoretical Astronomy and Astrophysics Symposium (Rironkon), Hirosaki, Japan Dec. 2023
- International Cosmic Ray Conference, Nagoya, Japan July 2023
- The 9th Galaxy Evolution Workshop, Kyoto, Japan Feb. 2023
- Cosmic Rays II: The salt of the star-formation recipe, Florence, Italy Nov. 2022
- COSPAR 44th Scientific Assembly, Athens, Greece (online), 2 talks July 2022
- 27th European Cosmic Ray Symposium, Nijmegen, Netherlands (online) July 2022
- International Cosmic Ray Conference, Berlin, Germany (online), 3 talks July 2021

## OUTREACH & PUBLIC ENGAGEMENT

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### Science Communication and Education

JSPS Science Dialogue Program Since June 2023

*Delivering outreach talks on science and astrophysics at high schools in Japan (talks in English)*

### Science Writing

*Astronomy & Geophysics* **invited feature article**: ‘The secret agent of galaxy evolution’, Volume 64, Issue 1, February 2023, pp. 29-25, <https://doi.org/10.1093/astrogeo/atac090>

### Invited Public Outreach Talks

- Croydon Astronomical Society talk, London, UK Sept. 2017  
*The Birth of Stars Throughout the Universe*
- Vectis Astronomical Society, Isle of Wight, UK: July. 2016  
*Cosmic Rays in a Violent Universe*
- Croydon Astronomical Society talk, London, UK: April. 2016  
*The Epoch of Cosmic Reionization*

## WORKSHOPS & TRAINING

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- **Invited:** Munich Institute for Astro- and Particle Physics (MIAPP), Germany Oct. 2022  
*Star-Forming Clumps and Starbursts across Cosmic Time*
- 46th Saas-Fee Advanced Course, Les Diablerets, Switzerland Mar. 2016  
*Lyman- $\alpha$  as an astrophysical and cosmological tool*
- ICTP Advanced Workshop, Trieste, Italy Mar. 2015  
*Cosmological Structures from Reionisation to Galaxies: Combining efforts from analytical and numerical methods*
- ARCHER Workshop on parallel and high performance computing, London, UK Mar. 2015  
*Hands-On Introduction to High Performance Computing*

## SKILLS & EXPERIENCE

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- **Programming languages:** Fortran 77/90 (including parallel computing experience with OpenMP and MPI), Python, Numerical simulations with FLASH4
- **Observing experience:** 28 nights, H.E.S.S. Array, Namibia
- **Languages:** Native: English; Basic conversational: Mandarin Chinese, German & French

## PROFESSIONAL MEMBERSHIP

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- Astronomical Society of Japan - member since 2023
- Royal Astronomical Society, UK - fellow since 2014
- Institute of Physics, UK - since 2009; elected as MInstP in 2022
- European Astronomical Society - member since 2017
- American Astronomical Society - member since 2020