Samuel Lai

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Statement

I am an astrophysics researcher specialising in accretion onto compact objects. By combining high performance computing simulations of accretion discs with high quality spectroscopic observations, I develop novel ways of understanding the diversity of observable phenomena. My goal is to study multiwavelength data of ultraluminous black holes in the early universe to understand their cosmic history, how they continue to grow, and how they affect their host galaxies/environment.

Education

Mar 2021 – Feb 2024 **Australian National University**, *Australia*
Research School of Astronomy & Astrophysics
Website: https://www.anu.edu.au/
- Astrophysics PhD

Sept 2018 – Nov 2019 **University College London**, *United Kingdom*
Department of Physics & Astronomy
Website: https://www.ucl.ac.uk
- Astrophysics MSc
- Distinction, 87.85/100.00

Sept 2014 – June 2018 **University of California – Los Angeles**, *United States*
College of Letters and Science
Website: https://www.ucla.edu
- Astrophysics BSc
- Magna Cum Laude, 3.87/4.00 GPA

Research

Feb 2024 – Present **VLBI Image Reconstruction with Machine/Deep Learning**
Team: Dr. Nithyanandan Thyagarajan, Dr. Ivy Wong

Sept 2020 – Present **Ancient Supermassive Actively-Accreting Black Holes**
Mentor(s): Dr. Christopher Onken, A/Prof. Christian Wolf, and Dr. Fuyan Bian
Thesis Title: *High-Redshift Ultraluminous Quasi-Stellar Objects*

Nov 2015 – Sept 2020 **Dust-Contaminated White Dwarfs with Infrared Excess**
Mentor(s): Dr. Siyi Xu (许偲艺), assistant astronomer at Gemini Observatory

Oct 2018 – Nov 2019 **Emission from Black Hole Event Horizon**
Mentor(s): Dr. Ziri Younsi and Prof. Kinwah Wu
Thesis Title: *Black Hole Jet Simulation and Images*

Jul 2017 – June 2018 **Harmonic Analysis of Gravitational Wave Power in Binary System; Simulation of Stochastically-Driven Coupled Oscillator Grid**
Mentor(s): Prof. Kenneth Young, Emeritus Professor at CUHK
Thesis Title: *Gravitational waves from a binary system: A detailed analysis of orbital decay*

Apr 2017 – Aug 2018 **Galactic Morphology by Surface Brightness and Isophotal Contours**
Mentor(s): Dr. Michael Rich, research astronomer at UCLA

Relevant Work Experience

Feb 2024 – Present **Commonwealth Scientific and Industrial Research Organisation**, CERC Postdoctoral Fellow
Website: https://www.csiro.au/en/

July 2022 – Feb 2024 **Australian National University**, RSAA Publications Officer
ANU 2.3m Time Allocation Committee
Website: https://rsaa.anu.edu.au/research/publications

Aug – Oct 2021 **European Southern Observatory**, PhD Studentship Programme
Website: https://www.eso.org/

Jan – June 2020 **Gemini Observatory**, Short-term Research Scholar
Website: https://www.gemini.edu/

June – Aug 2013 **Cluster Technology Limited**, Software Trainee
Website: https://www.clustertech.com
- Project Management Team

June – Aug 2012
- Software Development Team

Selected Publications

2023 **Characterising SMSS J2157–3602, the most luminous known quasar, with accretion disc models**
Authors: **Samuel Lai,** Christian Wolf, Christopher A Onken, Fuyan Bian
Monthly Notices of the Royal Astronomical Society

AllBRICQS: The All-sky BRIght, Complete Quasar Survey
Authors: Christopher A Onken, Christian Wolf, Wei Jeat Hon, **Samuel Lai**, Patrick Tisserand, Rachel Webster
Publications of the Astronomical Society of Australia

2022 **Chemical Abundance of z ~ 6 quasar broad-line regions in the XQR-30 sample**
Authors: **Samuel Lai,** Fuyan Bian, Christopher A Onken, Christian Wolf, Chiara Mazzucchelli, Eduardo Banados, Manuela Bischetti, Sarah E I Bosman, George Becker, Guido Cupani, Valentina D'Odorico, Anna-Christina Eilers, Xiaohui Fan, Emanuele Paolo Farina, Masafusa Onoue, Jan-Torge Schindler, Fabian Walter, Feige Wang, Jinyi Yang, Yongda Zhu

Monthly Notices of the Royal Astronomical Society

Discovery of the most luminous quasar of the last 9 Gyr

Authors: Christopher A Onken, **Samuel Lai**, Christian Wolf, Adrian B Lucy, Wei Jeat Hon, Patrick Tisserand, Jennifer L Sokoloski, Gerardo J M Luna, Rajeev Manick, Xiaohui Fan, Fuyan Bian

Publications of the Astronomical Society of Australia

2021 **Infrared Excesses around Bright White Dwarfs from Gaia and unWISE. II.**

Authors: **Samuel Lai**, Erik Dennihy, Siyi Xu, Atsuko Nitta, Scot Kleinman, S.K. Leggett, Amy Bonsor, Simon Hodgkin, Alberto Rebassa-Mansergas, Laura K. Rogers

Astrophysical Journal

2020 **Five New Post-main-sequence Debris Disks with Gaseous Emission**

Authors: Erik Dennihy, Siyi Xu, **Samuel Lai**, Amy Bonsor, J.C. Clemens, Patrick Dufour, Boris T. Gansicke, Nicola Pietro Gentile Fusillo, Francois Hardy, R.J. Hegedus, J.J. Hermes, B.C. Kaiser, Markus Kissler-Patig, Beth Klein, Christopher J. Manser, Joshua S. Reding

Astrophysical Journal

Infrared Excesses around Bright White Dwarfs from Gaia and unWISE. I.

Authors: Siyi Xu, **Samuel Lai**, Erik Dennihy

Astrophysical Journal

Awards and Prizes

2021	**Mt. Stromlo Student Seminars** – Best Science Talk	Australian National University
2019	**Harrie Massey Prize** – Best Overall Astrophysics MSc	University College London
	Mathematical and Physical Sciences Dean's Commendation	

Teaching and Outreach

2024 **Discovery of J0529–4351**

Interviews: BBC, ABC, Associated Press, 7News

Radio: Triple J Hack, SpaceTime with Stuart Gary, Canadian National Radio, 2CC, 6PR

2023 **Astronomy Australia Ltd. ESO Blog (Link)**

ASTR3002/ASTR6002 – Galaxies and Cosmology Course

ESO Studentship

Student: Yanina Bonilla Lopez

ASTR3005 – Astrophysics Research Course

Student: Ashley Hai Tung Tan

ANU 2.3m Telescope Training

Student: Neelesh Amrutha

2022 **ANU 2.3m Telescope Training**

Students: Jemma Pilossof, Cassidy Grae Mihalenko

ASTR3005 – Astrophysics Research Course

Student: Zachary Steyn

ASTR3002/ASTR6002 – Galaxies and Cosmology Course

J1144-4308 NPR Radio Interview

https://www.nprillinois.org/2022-06-16/scientists-unexpectedly-discover-the-fastest-growing-black-hole

Discovery of J1144-4308

e.g. https://cosmosmagazine.com/space/fastest-growing-black-hole-anu/

2020 **Journey through the Universe 2020 – Gemini Observatory**

JWST Proposal Workshop

ICS Alumni Newsletter

2019 **ICS High School Astronomy Club**

ICS High School Chemistry

Talks/Presentations

Aug 2024	Melbourne, Australia	University of Melbourne **Invited** Colloquium
June 2024	Online	Astronomical Society of Australia (ASA) Annual Science Meeting
Mar 2024	Perth, Australia	CSIRO Space & Astronomy Colloquium
Feb 2024	Canberra, Australia	PhD End-of-Thesis Talk
Jan 2024	Hong Kong	Hong Kong Polytechnic University **Invited** Colloquium
Sept 2023	Online	ASA Early Career Researcher Symposium (https://www.youtube.com/watch?v=QsKj_t5zjnU)
July 2023	Sydney, Australia	Astronomical Society of Australia (ASA) Annual Science Meeting
March 2023	Canberra, Australia	RSAA Journal Club
September 2022	Online	Gemini Observatory Journal Club
September 2022	Tucson, Arizona	University of Arizona Extragalactic Group
September 2022	Tucson, Arizona	Steward / NOIRLab Galaxy Group
September 2022	Sedona, Arizona	Giant Magellan Telescope Community Science Meeting
March 2022	Online	XQR-30 WP3
July 2022	Canberra, Australia	PhD Thesis Presentation
July 2022	Tasmania, Australia	Astronomical Society of Australia (ASA) Annual Science Meeting[1]
February 2022	Online	European Southern Observatory TMT
November 2021	Online	Mt. Stromlo Student Seminars
September 2019	London, United Kingdom	MSc Thesis Defense

1 Poster