



THE UNIVERSITY OF WESTERN AUSTRALIA

Position Title:	ASTRO 3D Research Scientist in Astrophysical Simulations of Galaxy Formation
Position Classification:	Level A
Position Number:	NEW
Faculty/Office:	Faculty of Science
School/Division:	School of Physics
Centre/Section:	International Centre for Radio Astronomy Research
Supervisor Title:	Associate Professor
Supervisor Position Number:	312868

About the University

Over 100 years ago, The University of Western Australia was founded with the aim of advancing the welfare and prosperity of its community.

UWA has risen to changing social and economic challenges, while achieving international standards, educating world-class graduates, producing ground breaking research and engaging in our community.

Delivering practical benefits to the community has always been at our core. We do this through the creation and sharing of knowledge, to foster a deeper understanding of our subject, ourselves and the world around us. That's because we believe that understanding is the key to a better future. Through understanding comes progress and through progress we can help create a better future for all.

UWA is already ranked in the top 1% of the world's universities, but our goal is to be recognised as on the world's top 50, for education as well as research.

The University of Western Australia has an international reputation for excellence and enterprise and has been rated as one of the best comprehensive universities in Australia. It is one of the country's leading research institutions as demonstrated by our Nobel Laureate and is the only WA member of the prestigious "Group of Eight" research universities.

The University is undergoing a period of transformational change to gain greater efficiencies, improve value, services and satisfaction. In this period of change the University remains focussed on being a world leader. The attraction and retention of the world's best employees is critical to achieving the University's strategic aim of being in the top 50 universities by 2050.

Vision and Values

The University of Western Australia vision is achieving international excellence.

Its core values underpinning our activities are a commitment to:

- A high performance culture designed to achieve international excellence
- Academic freedom to encourage staff and students to engage in the open exchange of ideas and thought
- Continuous improvement through self-examination and external review
- Fostering the values of openness, honesty, tolerance, fairness, trust and responsibility in social, moral and academic matters
- Transparency in decision making and accountability
- Equity and merit as the fundamental principles for the achievement of the full potential of all staff and students

All staff are expected to comply with the Code of Ethics and the University's Code of Conduct and demonstrate a commitment to its Equity and Diversity and Safety principles and the General Capabilities of personal effectiveness, working collaboratively and demonstrating a focus on results. Details of the University policies on these can be accessed at http://www.hr.uwa.edu.au/publications/code_of_ethics, <http://www.equity.uwa.edu.au> and <http://www.safety.uwa.edu.au/policies>.

Your work area

The Australian Research Council (ARC) Centre of Excellence for All Sky Astrophysics in 3 Dimensions (ASTRO 3D), headed by Professor Lisa Kewley, spans six Australian universities, three national infrastructure facilities, and seven international partner institutions and conducts world-leading observational and theoretical research focused on the main Centre scientific programs:

1. The Epoch of Reionization : This program will use the Murchison Wide-field Array in Western Australia to detect the sources at the epoch of reionization using rest-frame 21cm emission and to compare with the predictions of detailed theoretical simulations.
2. First Stars: This program aims to discover the oldest and most metal-poor stars in and around the Milky Way using ANU's SkyMapper telescope and determining their chemical compositions by means of high-resolution spectroscopy with telescopes like Keck and Magellan to shed light on their formation, evolution and nucleosynthesis.
3. First Galaxies: This program aims to discover the first galaxies in the universe with JWST and to reveal their chemical and star formation properties.
4. Galaxy Formation and Evolution: This research program, suitable for both theorists and observers, combines rest-frame UV, optical, and infrared Keck spectroscopy with large-scale numerical simulations to understand chemical evolution, mass build-up, and the accumulation of angular momentum in galaxies across cosmic time, gas transport through galaxies and in galactic outflows, and how chemical elements are incorporated into stars.
5. ASKAP Surveys: The Australian Square Kilometre Array Pathfinder is conducting three large surveys (FLASH, WALLABY, and DINGO) to measure the mass and angular momentum through neutral hydrogen gas of hundreds of thousand galaxies over the past 6 billion years.
6. SAMI: the SAMI survey is providing data on the kinematics, morphology and stellar populations of more than 3000 galaxies. This project will use this data to explore the role of angular momentum in determining the morphologies and star formation histories of galaxies. It will compare observations to simulations of galaxy formation to test models of angular momentum evolution during galaxy assembly.
7. GALAH: The GALactic Archaeology with HERMES (GALAH) survey is an ambitious spectroscopic survey on the Anglo-Australian Telescope with the ultimate goal of determining the detailed chemical composition of a million stars in the Milky Way to unravel the full assembly, dynamical, chemical, star formation and merger history of the Galaxy.
8. Data Intensive Science: the Centre is reliant on the efficient collection, processing, storage and curation of vast amounts of data from the Centre's scientific programs, requiring novel techniques and advanced algorithms to accomplish.

This research position focuses on developing and using astrophysical hydrodynamical simulations of galaxy formation to study gas in and around galaxies. These will form part of the Genesis Simulations programme, an integral part of the CAASTRO3D science program, which exploits high performance computing facilities on Australia's national peak facilities. The predictions will be directly compared with observations with ASKAP, in particular the FLASH survey, and there will be ample opportunity to work closely with the survey teams to both improve modelling and to better understand the observables. This research position will be embedded within the Computational Theory and Modelling team at ICRAR/UWA, but it will have close ties with researchers at the other ASTRO 3D host and partner institutions.

ASTRO 3D host institutions are: the Australian National University, the University of Sydney, the University of Melbourne, Swinburne University of Technology, University of Western Australia, and Curtin University.

ASTRO 3D partner institutions are: CSIRO, the Anglo-Australian Observatory, the National Computational Infrastructure, Caltech, the University of Washington (Seattle), the University of Toronto, Oxford University, the Heidelberg Institute for Theoretical Studies, the Netherlands Institute for Radio Astronomy (ASTRON), and the Chinese Academy of Sciences.

Organisation chart

ASTRO3D CI

ASTRO3D
PDRA
Position #

Your role and responsibilities

In their role as UWA academic level A in the International Centre for Radio Astronomy Research, the appointee will be expected to:

- Undertake internationally competitive research in astrophysical hydrodynamical simulations of galaxy formation, with a view to publishing original and innovative results in refereed journals, present research at academic seminars and at national and international conferences, and collaborate with other researchers at a national and/or international level.
- Actively collaborate with researchers within ICRAR/UWA and other ASTRO 3D nodes and partner institutes.
- Assist in aspects of software development for the simulations program, and assist with the running and analysis of the simulations on high performance computing facilities.
- Participate, as appropriate, in the supervision of research students, both at the undergraduate and post-graduate level.
- Undertake administrative functions primarily connected to the area of research, including preparation of research proposals and pursuing appropriate funding applications.
- Assist in outreach activities including to prospective students, research institutes, industry, government, the media and the general public.
- Comply with, maintain an awareness of and help promote all UWA policies and procedures and in particular those relating to work health and safety and equal opportunity.
- Perform other duties as requested, consistent with the classification level of the position.

Your specific work capabilities (selection criteria)

- PhD in astrophysical simulations or related discipline
- Expertise in astrophysics and high performance computing
- Experience in data intensive astronomy
- Proficiency in verbal and written communication
- Good publication record as evidenced by international refereed publications
- Demonstrated ability to work effectively in distributed scientific collaborations
- An understanding of equal opportunity principles and policies and a commitment to their application in a university context

Special Requirements (selection criteria)

None

Position Approvals

Approvals are now electronic. No signature section needed.