



THE UNIVERSITY  
of ADELAIDE



Faculty of Engineering, Computer and Mathematical Sciences

# SOLAR RECEIVER TECHNOLOGY

Up for a challenge? Join us to work on a research project with the Australian Solar Thermal Research Institute (ASTRI) receiver project.

## At a Glance

### Who can apply?

- Australian Citizens
- Onshore International students
- International applicants

### Industry partner or funding body

- Australian Solar Thermal Research Institute (ASTRI)
- Australian Renewable Energy Agency (ARENA)

### Program of Study available

- Doctor of Philosophy (PhD)
- Master of Philosophy (MPhil)

### Total annual stipend amount

- \$28,092 pa (if Commonwealth RTP scholarship secured)
- \$10,000 pa top-up from ASTRI

### Start date

- January 2021

### About the project

There is a need for the development of high-temperature solar receiver technology if advanced power cycles such as the s-CO<sub>2</sub> Brayton cycle are to be pursued. Current state-of-the-art molten salt receivers are limited in temperature to below 600°C. Through a detailed scoping study, the Australian Solar Thermal Research Institute (ASTRI) Receiver team identified sodium receivers and particle receivers as having most promise for further development. Sodium is an attractive heat transfer fluid, with a broad liquid temperature range suited to high temperature

concentrating solar power (CSP) applications and outstanding heat transfer properties which allow for innovative new receiver configurations to minimise heat loss.

The aim of this project is to investigate passive methods of convection suppression (cowlings, fillets, curvatures) through laboratory-scale wind and/or water tunnel experiments and computational fluid dynamics (CFD) modelling of a cavity receiver. This will develop understanding of how mechanical stresses and creep-fatigue mechanisms constrain design; investigate geometries that best take advantage of the heat transfer properties of sodium to demonstrate improved efficiency, ensuring higher receiver efficiency isn't counteracted by other losses (e.g. heat exchange) and building confidence that materials/coating exist for T>700°C. The design optimisation of high-temperature receivers for maximal efficiency and lifetime considering flux, temperature and stress limitations will be used to develop general guidelines on thermo-

mechanical design standards for high-temperature CSP.

The School of Mechanical Engineering at the University of Adelaide was ranked in the top 100 of Academic Ranking of World Universities (ARWU) in 2019. The Centre for Energy Technology (CET) are internationally recognised for their leading research into clean energy technologies and practices that reduce emissions, increase energy efficiency and decrease the cost of energy. The CET is one of South Australia's fastest-growing research groups working to transition our society to renewable energy, including a contribution to solar thermal energy research in ASTRI. ASTRI is funded by the Australian Renewable Energy Agency (ARENA). Further information is available at <https://www.astri.org.au>

## Eligibility criteria

- Applicants with strong experimental and numerical skills in fluid mechanics and aerodynamics, particularly in heat transfer, fluid mechanics and/or thermodynamics. Experience in wind/water tunnel experiments and CFD will be considered favourably.
- Excellent students who hold a Bachelor of Mechanical Engineering or a double degree with Civil Engineering would be especially suitable and encouraged to apply.
- Applicants with well-developed written and verbal communication skills will be considered favourably.

## Benefits

- Access to authorised travel and research project funds available
- Work alongside world leading researchers
- Our CaRST program: Free professional development to enhance your employability skills

- Exposure to industry networks and experts in the field
- No Tuition fees! These are waived for eligible candidates
- Access state of the art technology
- Become a field expert and make a real and contribute to solving global challenges
- Publish your contributions and impact our communities and society

## How to apply

- Complete an [expression of interest](#) and email together with a copy of your CV and transcripts to [matthew.emes@adelaide.edu.au](mailto:matthew.emes@adelaide.edu.au) or [maziar.arjomandi@adelaide.edu.au](mailto:maziar.arjomandi@adelaide.edu.au)
- Once your initial eligibility assessment is approved, formally lodge an application for admission and scholarship via the Adelaide Graduate Centre 'How to Apply' [link](#). **Application dates are listed on the website.**

## Researcher Profiles

- Use our [Researcher Profiles](#) to find out more about potential supervisors

## More about ECMS

The Faculty of Engineering, Computer and Mathematical Sciences is home to world-class research institutes and centres, and internationally renowned academics at the cutting edge of research and discovery.

We are a thriving centre of learning, teaching and research in a vast range of engineering disciplines, computer science, machine learning and high-level mathematics as well as designing Human-centred, sustainable futures in our School of Architecture and Built Environments.

Many of our academic staff are leaders in their fields and graduates are highly regarded by employers.

Learn more about the Faculty of Engineering, Computer and Mathematical Science's Research capabilities at: <https://ecms.adelaide.edu.au/research-impact>

**The University of Adelaide is an Equal Employment Opportunity employer. Women and Aboriginal and Torres Strait Islander people who meet the position requirements are strongly encouraged to apply.**

## FURTHER INFORMATION

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