# Position Details

## Research Projects- CSOF6

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| The following information is for applicants | |
| Advertised Job Title | Phased Array Systems Engineer – Space and Astronomy |
| Job Reference | 80203 |
| Tenure | Specified Term of three years  Full-time or job-share (if circumstances permit) |
| Salary Range | AU$117k - AU$138k per annum (pro-rata for part-time), plus up to 15.4% superannuation |
| Location(s) | Marsfield (Sydney) New South Wales |
| Relocation Assistance | Will be provided to the successful candidate if required (within Australia) |
| Applications are open to | To be eligible to work in CSIRO you must be an Australian Citizen, Permanent Resident or hold a valid working visa. |
| Position reports to the | Group Leader, Signal Processing Technologies Group |
| Client Focus – Internal | 50% |
| Client Focus – External | 50% |
| Number of Direct Reports | 0 |
| Enquire about this job | Dr Aaron Chippendale [Aaron.Chippendale@csiro.au](mailto:Aaron.Chippendale@csiro.au) or telephone 02 9372 4296 |
| How to apply | Apply online at <https://jobs.csiro.au/>  Internal applicants please apply via **Jobs Central**  If you experience difficulties when applying, please email [careers.online@csiro.au](mailto:careers.online@csiro.au) or call 1300 984 220. |

### Role Overview

The Technologies for Radio Astronomy program at CSIRO Space and Astronomy (S&A) supports Australia’s leadership in radio astronomy technology and infrastructure. We operate several world-class radio astronomy observatories collectively known as the Australia Telescope National Facility or ATNF. We design and deliver instrumentation and data-processing systems for our own telescopes, for international facilities, and even for space flight. Beyond astronomy our work is finding application in earth observation, satellite communications, and space situational awareness.

The Phased Array Systems Engineer will provide phased-array beamforming and system expertise to S&A and external? teams, developing innovative instrumentation for radio telescopes and satellite ground stations. The initial focus will be on commercialisation of a cryogenically cooled phased-array radio receiver for satellite communications downlink at microwave frequencies.

The Phased Array Systems Engineer will develop procedures to calibrate the antenna array and dynamically update digital beamformer weights to track satellites in low-earth orbit. Electromagnetic (EM) models of the antenna array will be provided by other team members. The Phased Array Systems Engineer will build software around the EM models to predict beam weights and beam performance as a function of azimuth, elevation, polarisation, and frequency. They will further be responsible for integrating this software with the phased-array's digital beamformer so that it can autonomously track satellites in known orbits across the sky. The role requires ­ working closely with other hardware and software engineers to implement beamforming and calibration algorithms on the array, develop a measurement and test plan for a demonstration array, and help commission the demonstrator on site.

CSIRO S&A is committed to providing a safe and inclusive workplace culture and implementing initiatives to improve diversity and equity within our workplace. All team members have access to CSIRO’s “Balance’” flexible work arrangements (details [here](https://www.csiro.au/en/careers/life-at-csiro/Balance)) and professional training and development opportunities. This role is offered on a full-time or (if circumstances permit) job-share basis

### Duties and Key Result Areas

* Work closely with antenna and signal processing engineers to optimise digital beamforming and calibration approaches for the array.
* Write software to evaluate predictions of the beamformed array performance in various scenarios and to calculate weights for the digital beamformer to steer beams.
* Explore and implement spatial nulling techniques in the digital beamformer to reject unwanted radio frequency interference (RFI).
* Work closely with hardware and software engineers to validate the digital beamformer and implement dynamic beam tracking to receive signals from satellites and null unwanted signals.
* Develop measurement and test plans to evaluate array calibration and beamforming performance and oversee the tests.
* Conduct on-site commissioning measurement / verification of beamforming performance.
* Contribute to innovation in beamforming and calibration across a variety of radio astronomy, space tracking, and communication projects.
* Maintain confidentiality when accessing commercially sensitive information of CSIRO and/or research or commercial partners.
* Engage in project timelines, self-managing progress and responding to deadlines.
* Provide technical leadership within and outside the team and collaborate with other teams to meet objectives as required.
* Address problems promptly and in a constructive manner.
* Participate in project scoping and planning, making contributions to the technological direction.
* Effectively communicate concepts and results to internal and external parties, including those less familiar with the field.
* Communicate openly, effectively and respectfully with all staff, clients and suppliers in the interests of good business practice, collaboration and enhancement of CSIRO’s reputation. This may include participating in local and overseas conferences.
* Work collaboratively as part of a multi-disciplinary, regionally dispersed research team.
* Adhere to the spirit and practice of CSIRO’s Values, Code of Conduct, Health, Safety and Environment procedures and policy, Diversity initiatives and Zero Harm goals.
* Other duties as directed.

## **Selection Criteria**

#### Essential

*Under CSIRO policy only those who meet all essential criteria can be appointed.*

1. A minimum of a bachelor’s degree in an area relevant to this position.
2. Familiarity with digital signal processing (DSP) theory and techniques, such as FFT’s, correlation, linear filters, linear algebra, and demonstrated ability in numerical simulation of DSP systems.
3. Demonstrated experience and proficiency in programming, data manipulation, and visualisation using languages such as Python and C/C++.
4. Aptitude for system development, testing, integration, and verification in a collaborative environment under version control.
5. Ability to work effectively both individually and as a member of a collaborative technical team.

## **Desirable**

1. Experience in antenna array signal processing, preferably system modelling and/or measurement for beamforming and array calibration.
2. Ground station and satellite tracking domain knowledge including digital communications, modulation, coding, and link budgets and experience with associated hardware and software.
3. Ability to help model and measure the signal-to-noise ratio and bit error rate for the end-to-end signal path.
4. Practical experience with digital signal processing systems implemented on field programmable gate array (FPGA) platforms, including basic knowledge of hardware description language (HDL).
5. Experience with radio astronomy systems including low-noise receiving arrays and associated digital signal processing systems and techniques.

## **Required Competencies:**

* **Teamwork and Collaboration:** Cooperates with others to achieve organisational objectives and may share team resources in order to do this. Collaborates with other teams as well as industry colleagues.
* **Influence and Communication:** Identifies critical stakeholders and influences them via an influential third party, for example through an established network, to gain support for sometimes contentious, proposals/ideas.
* **Resource Management/Leadership:** Provides leadership that fosters an environment that encourages new ideas and provides support for the development of emerging skills. Creates trust by displaying consistency, understanding, integrity and patience. Plans, seeks, allocates and monitors resources to achieve outcomes.
* **Judgement and Problem Solving:** Anticipates and manages problems in ambiguous situations. Develops and selects an appropriate course of action and provides for contingencies. Evaluates, interprets and integrates complex bodies of information and draws logical conclusions, synthesises proposals and defends options with reasoned arguments.
* **Independence:** Assesses the risk and opportunity of identified strategies, options and actions. Overcomes problems and setbacks in achieving goals. Invariably includes consideration of value-added future impact on bottom line when determining the optimal and efficient use of resources.
* **Adaptability:**Demonstrates flexibility in thinking and adapts to and manages the increasing rate of organisational change by adjusting strategies, goals and priorities.

Special Requirements

The successful candidate will be asked to obtain and provide evidence of a National Police Clearance or equivalent. Please note that individuals with criminal records are not automatically deemed ineligible. Each application will be considered on its merits.

To be eligible for this position you must be willing and able to work flexible hours when required, and spend periods of up to two weeks at a time working at locations away from Sydney.

While most of the work will be in office and laboratory environments, at times field work in various weather conditions will be required.

Eligibility to obtain a security clearance at the Secret (NV1) level is advantageous.

## **About CSIRO**

We solve the greatest challenges through innovative science and technology. Visit [CSIRO Online](http://www.csiro.au/) and [CSIRO Space and Astronomy](https://www.csiro.au/en/Research/Astronomy) for more information.

CSIRO is a values-based organisation.  In your application and at interview you will need to demonstrate behaviours aligned to our values of:

1. People First
2. Further Together
3. Making it Real
4. Trusted