THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF SCIENCE & ENGINEERING

SCHOOL OF NATURAL SCIENCES

DEPARTMENT OF PHYSICS & ASTRONOMY

RESEARCH ASSOCIATE IN PULSAR AND FAST TRANSIENT SEARCH, MACHINE LEARNING AND PIPELINE DEVELOPING

VACANCY REF: S&E-14384

Salary:	£32,236 to £39,609 per annum (according to relevant experience)
Hours:	Full Time
Duration:	1 October 2019 until 31 March 2021
Location:	Sackville Street, Manchester

Enquiries about the vacancy, shortlisting and interviews:
Contact: Professor Ben Stappers
Email: ben.stappers@manchester.ac.uk

BACKGROUND

The SKA will be the most sensitive radio telescope ever built and will play a major role in answering key questions in modern astrophysics and cosmology (see www.skatelescope.org). It will be one of a small number of cornerstone observatories across the electromagnetic spectrum that will transform our view of the Universe. The University of Manchester is one of three major UK university contributors to the SKA, together with Cambridge and Oxford, and its Jodrell Bank Observatory is the location of the international headquarters of the SKA Organization, the UK-based legal entity that directs the project. The University also operates the e-MERLIN interferometer which is an SKA Pathfinder instrument.

The Manchester SKA Group is headed by Prof Keith Grainge and composed of a team of more than a dozen astronomers and engineers from the School of Physics and Astronomy (Jodrell Bank Observatory and Jodrell Bank Centre for Astrophysics) and the School of Electronic and Electrical Engineering. SKA activity in Manchester encompasses the science case and a number of engineering developments including the hardware design, construction, and verification of the signal & data transport and synchronization & timing sub- systems, non-imaging processing for pulsars and transients, and aperture array receiver design. The University of Manchester leads an international Consortium on the signal & data transport and synchronization & timing. It also leads the international team developing the pulsar and fast transient search capabilities for the SKA and contributes strongly to the associated science case. The successful candidate would join a team including two academics and three engineers working directly on pulsar and fast

transient work for the SKA.

Overall Purpose of the Job:

As part of the UoM SKA Group the post holder will be involved in the specification, design, development, and verification of software to achieve the Non-imaging processing requirements for the real-time and off-line analysis of pulsar and fast transient data. This will include software both searching for new systems as well as the post-processing of these data. They will also undertake SKA-related research on applying machine learning techniques to pulsar and fast transient searches and apply it to data from SKA precursor and pathfinder telescopes. This work will support the UoM SKA Group's work leading up to the start of Construction of the SKA. They will also be a member of the UK-led Time Domain Team.

Key Responsibilities, Accountabilities or Duties:

The range of duties will include:

- Specification, development and prototyping of pulsar and fast transient search pipelines for the SKA telescope and test them on the precursors/pathfinders.
- Design, specification and testing of machine learning algorithms for pulsar and fast transient search pipelines for use with the SKA telescope and use them on data from the precursors/pathfinders.
- Write up results of this work as appropriate for reporting to the SKA Organisation and the Time Domain Team.
- Work on using the prototyping hardware for continued development and testing of the non-imaging processing pipelines.
- Carry out the detailed verification and validation of the software and prototype hardware as required to reach sufficient technology readiness for the pre- construction phase
- Communicate these results through presentations at meetings and national and international conferences.
- Carry out and write up original research for peer-reviewed journals.
- Assist with supervision of PhD and Masters students working on related topics.

PERSON SPECIFICATION

Essential Knowledge, Skills and Experience*:*

- Have a PhD in Astronomy or Computer Science – with demonstrable knowledge of both.
- Experience in research methods and techniques to work within the pulsar or fast radio transient field.
- Proven track record in the development of non-imaging signal processing software systems.
- Proven ability to work independently and as part of a team.
- Proven ability to meet deadlines.
- Experience with any or all of C, C++, Cuda/OpenCL;
- Flexible approach to dealing with research problems as they arise.
- Willingness to learn and develop.
- Excellent communication and interpersonal skills.

- Excellent time management and organisational skills.
- Ability to present in both written and oral publications.
- Good journal publication record.

Desirable Knowledge, Skills, Experience and Qualifications:

- Experience in writing and applying data reduction pipelines for one of the SKA pathfinder arrays.
- Experience in commissioning instrumentation;
- Experience in using and managing large computer systems;
- Experience in radio frequency techniques;
- Experience with Matlab or scripting software packages;
- Experience of system engineering processes;