

A census of bright southern sky pulsars with the Engineering Development Array

Since their discovery over 50 years ago, pulsars have been amongst the most fascinating astrophysical objects. They are extremely dense objects, built primarily of neutrons (and hence called neutron stars), rotating at rates of up to several hundreds of times per second and emitting beacons of radio emission. These radio pulses are extremely regular in their arrival times and therefore pulsars (especially those with spin periods of the order of a few milliseconds) can be used for high-precision timing applications, such as searches for low-frequency gravitational waves that are produced by super-massive black-hole mergers. Their timing properties can also be exploited in the commissioning phases of new radio telescopes and instrumentation.

The Engineering Development Array 2 (EDA2; Wayth et al. in preparation) is one of the precursor stations of the low-frequency component of the Square Kilometre Array ([SKA-Low](#)), which will be built at the Murchison Radio-astronomy Observatory in the next decade. It consists of 256 MWA dipole antennas, the analogue signals from which can be digitised and processed. The current software and firmware enable electronic steering of the beam in arbitrary direction in the sky and the forming of station beam in real-time. This allows us to relatively easily observe and verify the detections of many known, bright pulsars and we expect to detect at least 100 with the EDA2.

The main goal of this project is to perform a series of short observations of a modest sample of southern-sky pulsars with the EDA2 or other SKA-Low precursor stations and verify their detections. This will be a useful exercise in ascertaining the sensitivity and polarimetric characteristics of prototype SKA-Low station telescopes. The results of this shallow all-sky survey will be compared with the number of detections expected according to the mean flux densities of these pulsars, the sensitivity of the SKA-Low station at the observing frequencies and toward the sky positions of pulsars during the observations. The characteristics of the detected pulsars, such as polarimetric pulse profiles, will be compared with those obtained with the [Murchison Widefield Array](#) and other published results.

Research Field

Radio Astronomy

Project Suitability

Honours / Masters

Project Supervisor

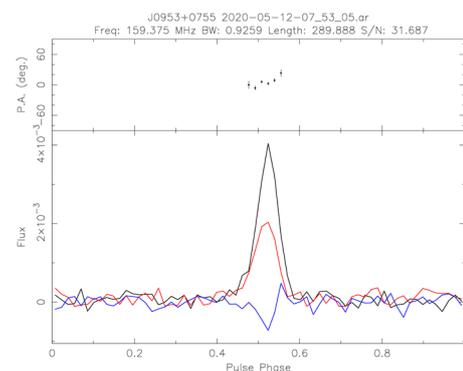
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Detection of the pulsar B0950+08 with the EDA2



Panorama of the Engineering Development Array 1 at the Murchison Radio-astronomy Observatory