

Abstract for the URSI AT-RASC 2018

(The 2nd URSI Radio-Science Meeting)

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Square Kilometre Array Phase 1 Central Signal Processor Software: An Overview

The Square Kilometre Array (SKA) project is an international collaboration aimed at building the world's largest radio telescope, with eventually over a square kilometre of collecting area, to be deployed in South Africa (mid-frequency array) and Australia (low-frequency array). The Central Signal Processor (CSP) receives signal from 197 antennas (in SKA1 MID Telescope) and up to 8 beams from each of 512 Low-Frequency Aperture Array stations (in LOW Telescope) and, in each telescope, simultaneously cross-correlates signal from each pair of antennas/stations (to produce the full-polarization visibility spectra), searches for pulsars and transients, and performs precision-timing for known pulsars. The CSP, in each Telescope, consists of the three major sub-systems each of which performs a different signal processing task, namely: i) correlation and beamforming, ii) search for pulsars and transients, and iii) pulsar timing. The fourth CSP sub-system is responsible for the overall monitor and control.

Design for the SKA Phase1 is well-under way and approaching the Critical Design Review (CDR) which is the gate for the start of construction. Work on the SKA1 CSP design is performed by the SKA1 CSP Consortium which includes a rich mixture of scientists and engineers from various academic institutions, industry and government labs spread over 5 continents. This report presents a high-level overview of the proposed design with the emphasis on the software requirements, architecture and design.

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10. January, 2018