

*Working title:* The SKA - extreme antenna engineering

Prof David B Davidson, South African SKA Research Chair in Engineering Electromagnetics, Stellenbosch University

The Square Kilometre Array is one of the most ambitious international mega-science project currently in progress. Originally mooted in 1991 as “The Hydrogen Array”, the project is fast approaching realization. In May 2012, a split-site decision was announced, with the telescope to be built in Southern African and Australia/New Zealand. In March 2013, the baseline design was published. Presently, the overriding focus is on the final detailed design phase, which is scheduled for completion in 2016. This should permit construction to begin in 2018 and to be completed around 2023.

SKA1 relies heavily on several precursor instruments, including the South African KAT-7 and MeerKAT and the Australian ASKAP telescopes. The March 2013 baseline design for SKA Phase 1 envisages three major components: SKA1-mid, which will add 190 SKA dishes to MeerKAT’s 64 dishes on the South African Karoo site; SKA1-Survey, which adds 60 SKA mid-frequency dishes to the 36-dish ASKAP array in Western Australia; and SKA1-low, a low-frequency sparse aperture array consisting of around 250,000 log-periodic elements, also deployed in Western Australia. The budget for SKA Phase 1 is presently set at around 650m euros. SKA phase 2, the build-out to the full square kilometre of receiving area, will involve perhaps an order of magnitude more antennas, making this truly extreme antenna engineering.

Whilst the SKA telescope is a complex instrument, involving not least the development of an exaflop computing system, the antennas will probably be the most long-lived component of the system. This talk will address the engineering of these, in particular focussing on the MeerKAT dishes and the aperture arrays.