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The SKA1_Low Telescope: The Station Design and Prototyping

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The Square Kilometre Array (SKA) [1] telescope consists in its first phase of two arrays, a dish array to be constructed in South Africa and a low frequency aperture array to be constructed in Western Australia. The aperture array, SKA1-Low, will consist of 512 stations, each with 256 wide bandwidth log periodic antennas. The frequency range of SKA1-Low is 50 to 350 MHz. The Low Frequency Aperture Array (LFAA) consortium is tasked to design the station, the infrastructure around them and the station signal processing.

The LFAA consortium is led by the Netherlands Institute for Radio Astronomy (ASTRON) and includes the International Centre for Radio Astronomy Research (ICRAR), Australia; the Key Lab of Aperture Array and Space Application (KLAASA), China; the National Institute for Astrophysics (INAF), Italy; the University of Malta; the University of Cambridge, UK; the University of Manchester, UK; the University of Oxford, UK; the Science and Technology Facilities Council (STFC), UK; Observatoire de la Cote d'Azur, France; and Station de Radioastronomie de Nançay, France.

The wide bandwidth antennas are placed in a semi-random sparse configuration in order to suppress grating lobes and side lobes. Station diameter is 40m. The signals from the antennas are transported by means of radio over fibre links to processing facilities in which digitization, station calibration and beam forming is performed.



Figure. 1 Photograph of the prototype station in Western Australia

A first prototype station [2] has been realized at the Murchison Radio Observatory, Western Australia, see Figure 1. Initial results are good. Calibration and verification are planned for 2018.

1. The Square Kilometre Array, www.skatelescope.org

2. P. Benthem et al., "The Low Frequency Receivers Design and Verification for SKA1_Low", 32nd URSI GASS, Montreal, Aug. 2017.