SEARCHING FOR EXTRATERRESTRIAL INTELLIGENCE WITH THE SQUARE KILOMETRE ARRAY. Andrew P. V. Siemion[1;2;3], James Benford[4], Jin Cheng-Jin[5], Jayanth Chennamangalam[6], James Cordes[7], David R. DeBoer[3], Heino Falcke[2;1;8;9], Duncan H. Forgan[10], Mike Garrett[1;11], Simon Garrington[12], Leonid Gurvits[13;14], Melvin Hoare[15], Eric J. Korpela[3], T. Joseph W. Lazio[16], David Messerschmitt[3], Ian S. Morrison[17], Tim O'Brien[10], Zsolt Paragi[13], Alan Penny[10], Laura Spitler[7], Jill C. Tarter[18], Dan Werthimer[3]
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Abstract: The Square Kilometre Array (SKA) is an ambitious new international radio telescope that, when complete, will feature a square-kilometer of collecting area, broad frequency coverage from 10s of MHz to many GHz and flexible observing modes permitting many types of astronomical observations. The SKA will offer revolutionary new observational capabilities for the Search for Extraterrestrial Intelligence (SETI) [1, 2, 3, 4]. SKA construction is expected to be completed in two phases. SKA Phase 1 will include a low frequency (SKA1-LOW, 50 – 350 MHz) array component made up of 130,000 dipole antennas sited in Southern Australia and a 200-dish mid-frequency (SKA1-MID, 350 – 14000 MHz) component sited in Southern Africa. SKA Phase 2 will complete telescope construction at both sites and could include augmentation with new mid-frequency aperture array technology that could dramatically expand the telescope's primary field of view.

The SKA will enable a sensitive and comprehensive test of the fundamental hypothesis of modern radio SETI: that advanced civilizations might possess technology that produces powerful narrow-band radio signals. In addition, the flexible SETI search systems used on the SKA will allow searches for whole new classes of emission from advanced technologies, including various types of broadband and intermittent radio signals. The SETI observing capabilities on the SKA will include a commensal ("piggy-back") mode that permits electronically-steered SETI observations to be conducted alongside all other uses of the telescope, allowing a sensitive survey of hundreds of thousands of exoplanets, stars and galaxies in its first few years of operation.

Here we will briefly discuss the status and anticipated performance parameters of the SKA telescope, paying particular attention to how the capabilities of the telescope and its digital SETI search systems will enable novel, sensitive SETI observations. We will also discuss how the SKA will be used for both commensal and primary-user observations, and present several straw-man SETI observing scenarios and their anticipated science outcomes. We will conclude with information on how others in the astrobiology community can become involved in defining the SKA's SETI observing capabilities and eventual search program.

References:

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