The Square Kilometre Array (SKA) - A Transformational Telescope for the Next Decade and Beyond

An AAS Splinter Session
January 8, 2019, 9.00-11.30 am.

The Square Kilometre Array (SKA) is a global effort to build the World's largest radio telescopes, which will transform our understanding in many areas of astrophysics identified as high priorities by the US community, including the history of our Universe and the emergence of the first stars and galaxies; the merger of super-massive black-holes and their release of gravitational waves, as tests of General Relativity; the enigmatic powerful bursts of radio emission (Fast Radio Bursts) whose origin and nature remain controversial; the formation of planets and search for extraterrestrial life; and many other areas of great interest to astronomers in the US and worldwide.

The SKA is nearing the end of its design phase, with construction activities beginning before the decade's end. This session will present the grand vision for the SKA, highlight key science areas of interest to the US and global communities, and provide an update on current progress toward construction, followed by full observations in the second half of the coming decade. As well as a keynote address and a progress update, presentations will be made on the following science topics: *"Evolution of Galaxies", "Cosmology and the Cosmic Dawn", "A dynamical Universe: Gravitational Waves and Fast Radio Transients"*, and *"The Cradle of Life: formation of planets and search for ET life"*.

0. Welcome. Phil Diamond (5 min)

1. Keynote.
Jocelyn Bell Burnell (30 min incl. questions)
The SKA vision. (SKA1, Full SKA, the Science, the Telescopes, the Challenge)

2. Evolution of Galaxies.
Kristine Spekkens (20 min, incl. questions)
(Royal Military College of Canada/Queen's University, Canada)
"Galaxy Evolution, including the formation, evolution, dynamics, and properties of supermassive black holes, galaxies, and galaxy clusters, active galactic nuclei and QSOs, mergers, star formation rates, gas accretion, and the circumgalactic and intergalactic media."

3. Cosmology and the Cosmic Dawn/EoR.
James Aguirre (20 min)
(University of Pennsylvania)
"Cosmology and Fundamental Physics, including the early universe, the cosmic microwave background, reionization and galaxy formation up to the virialization of protogalaxies, large scale structure, the intergalactic medium, determination of cosmological parameters, dark

matter and dark energy, astroparticle physics, tests of gravity, and astronomically determined physical constants."

4. A dynamical Universe: Gravitational Waves and Fast Radio Transients.
Ingrid Stairs (20 min)
(University of British Columbia, Canada)
"Multi-Messenger Astronomy and Astrophysics, including the sources of gravitational waves, astrophysical and cosmogenic neutrinos, cosmic rays and gamma rays, and the coordinated multi-messenger and multi-wavelength follow-ups."

5. Cradle of Life: formation of planets and search for ET life.
Doug Johnstone (20 min)
(National Research Council - Herzberg/University of Victoria, Canada)
"Planetary Systems including solar system bodies (other than the Sun), debris disks, and extrasolar planets; exobiology and the search for life beyond the solar system"

6. SKA Current status.
Joe McMullin (30 min)
(Programme Director, SKA Organisation)
Including pathways for involvement of non-member countries/entities.