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Committee Secretary
Joint Standing Committee on Treaties
PO Box 6021
Parliament House
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Dear Committee Secretariat

RE: Square Kilometre Array Observatory Convention.

The Australian National University (ANU) welcomes the opportunity to make a submission to the Joint Standing Committee on Treaties (JSCOT) inquiry into the *Convention establishing the Square Kilometre Array Observatory* (the Convention).

The Square Kilometre Array (SKA) is one of the most ambitious global scientific projects of this century. Joining the SKA Observatory will allow Australia to participate in, and co-host in remote Western Australia, a 700 million Euro international astronomical observatory.

Australia is an astronomy powerhouse on the world stage. In the area of radio astronomy, Australia has been a leader since the field's inception in the middle of the last century. Led initially by CSIRO, with ever-growing involvement from the university sector, Australia has hosted some of the world's most powerful radio observatories. Our mid-latitude location, stable weather, and low population density make Australia one of the best places in the world to conduct radio astronomy.

The SKA offers us the opportunity to maintain and build on our leadership and drive international radio astronomy throughout the 21st century.

Australia has been actively involved in the SKA project since its inception in the early 1990s. As a founding partner in the SKA Organisation, Australia joined Canada, China, France, Germany, India, Italy, New Zealand, South Africa, Spain, Sweden, the Netherlands and the United Kingdom. Over the past two and half decades the project has evolved and progressed with construction to start in 2021, culminating in a powerful new telescope facility by 2027. During the design phase, our scientists and engineers have contributed to almost all aspects of the telescope design, from antenna design through signal and data transport to the software that will produce radio images of the Universe.

The SKA provides Australia with many opportunities. With this telescope our engineers and scientists are designing and implementing some of the most advanced technologies in radio frequency detection, which will undoubtedly have spin-offs in telecommunications and signal processing. Just as WiFi spun out of radio astronomy, the very sensitive, highly directional receivers designed for the SKA have applications in long-range communications and separating multiple radio signals. Similarly, the imaging processes employed have cross-overs with medical imaging and tomography.

As a 'big data' project, the SKA will continue to make advances in data and signal transport, high performance computing, and artificial intelligence development for data science. In full operation, the SKA antennas will generate 8 Terabits per second, an extraordinary data rate that will need to be handled by Australia's supercomputing facilities. Our supercomputers will need to archive 600 Petabytes of data per year and transfer around the world data volumes far exceeding the current global internet traffic. The supercomputing and networking requirements for the SKA will lead to improvements in Australia's connection speeds to the world.

In terms of astronomical discovery the SKA offers immense possibilities. We will be able to:

- Test the limits of the theory of gravitation.
- Detect gravitational waves from the merger of supermassive black holes.
- Discover the imprints of the first stars in the Universe.

ANU is leading the effort to use the SKA to better understand how our own galaxy, the Milky Way, has changed over the history of the Universe and our researchers are contributing to almost all topics addressed by the SKA, from cosmology to the evolution of galaxies.

By joining the SKA Observatory, Australia will capitalise on its technological, scientific, and geographic advantages to engage in big science on the world stage.

On behalf of ANU I would like to express my strong support for the ratification of the Convention. We are happy to provide senior academic staff to expand on this submission or appear before JSCOT should that be required.

Yours sincerely

Professor Brian P. Schmidt AC
Vice-Chancellor and President