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Measurements (1)

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SURVEILLANCE OF SPACE USING PASSIVE RADAR

**Abstract**

The Murchinson Widefield Array (MWA) is the low-frequency precursor to the Square Kilometer Array and in 2012 and 2013 it was shown that it can receive FM-radio broadcast signals reflected from the moon and from the International Space Station. Further to this, models showed that detection of sub-metre sized debris should be possible.

Passive radar is a class of radar that exploits readily available, non-cooperative sources of radio frequency energy as illuminators of opportunity in order to measure reflections from the environment and objects of interest. Due to continual improvements in computational processing, increasing spectral competition and congestion, and the ubiquitous nature of terrestrial transmitter, passive radar is a fast growing area of research.

In this paper we cover recent joint work to experimentally demonstrate the viability of passive radar for Space Situational Awareness using the MWA. Using real-world experimental data, we show that by applying passive radar processing techniques to MWA data, significant gains in signal-to-noise ratio can be achieved. Further to this, we show that the six state parameters of objects in orbit may be acquired and subsequently used to perform orbit characterisation/estimation off of a single pass. Lastly the paper will cover our ongoing experimental campaign to validate the earlier models to detect debris-sized objects.