

Measuring the Metre-Wave Sky Spectrum With Milli-Kelvin Accuracy: Engineering Challenges and Australian Opportunities

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Abstract

We describe a radio experiment that will test theories of structure formation in the early universe. The 1.42 GHz spectral line of neutral hydrogen, redshifted down to the 45-200 MHz band, traces the ionisation state of the intergalactic medium through the first billion years of the now 14 billion year old universe. Measuring the metre-wave sky spectrum with milli-Kelvin accuracy may thus detect the epoch when the first sources of ionising radiation formed, termed “the epoch of reionisation”. We discuss the engineering challenges presented by this experiment and the opportunities provided by radio-quiet sites in Australia.