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Detecting Faint Variable Features Using Square Kilometer Array

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The Sun is a plasma laboratory and is also the primary cause of space weather. Characteristics of various plasma systems, from the photosphere to the corona, can be captured by studying the emissions at radio wavelengths, which originate from a diverse set of emission mechanisms. The spectro-temporal structure of these emissions, their flux densities and polarimetric properties can vary dramatically across different phenomena, magnetic topologies, and emission processes. Even during periods of low solar activity, solar radio emissions exhibit variability in frequency and time. These emission features can be attributed to magnetic reconnection events crucial for the nanoflare-based coronal and chromospheric heating theories.

Recent Murchison Widefield Array (MWA) observations have detected emission features with flux densities at milli-Solar Flux Unit (SFU) levels, potentially linked to such small-scale flares [1]. The upcoming Square Kilometre Array Observatory (SKAO) promises increased sensitivity and better imaging quality, which could help further characterize these faint emissions.

We aim to simulate SKAO observations of this faint emission population with milli-SFU flux densities. This presentation will summarize the status of this effort and discuss the challenges associated with SKAO's observations of these subtle solar bursts.

References:

1. Rohit Sharma et al 2022 ApJ 937 99