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Phase Noise Analysis of a 1.712 GHz Clock Signal Transmitted over Optical Fibre for MeerKAT Time and Frequency Reference (TFR)

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Abstract content
   (Max 300 words)
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Special chars

MeerKAT telescope demands highly accurate and stable clock distribution over up to 12 km of optical fibre to remote dishes. The clock is required for digitization of radio astronomy signals. Phase stability is critical both for short term and long term requirements. The long term stability is important for very long baseline interferometry (VLBI) while the short term is vital for digitization process. The short term clock stability also known as clock jitter can be measured by analysing the phase noise performance of a signal. In this work, phase noise measurements were performed on optical transmitters used to distribute the clock signals so as to ascertain their contribution to the overall clock jitter of the system. A directly modulated distributed feedback (DFB) laser was shown to meet the maximum jitter requirement of 130 fs for a 1.712 GHz clock signal transmitted over 25 km of fibre. We further demonstrate that with optimized modulation depth, additional passive optical components in the link do not significantly degrade the phase noise response. Thus, A DFB laser was proven to be a suitable optical source that will meet the performance and link budget requirements for the MeerKAT telescope.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

PhD

Main supervisor (name and email)
and his / her institution

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Would you like to <br> submit a short paper <br> for the Conference
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Yes

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