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Laser Effect on the RF Signal Stability for Clock Signal Distribution over Optical Fibre

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Abstract content
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The optical clock signal should maintain a certain level of stability for successful operation of the MeerKAT and Square Kilometer Array (SKA) telescope. The flicker (1/f) noise of active devices in the optical link is converted into phase noise through the nonlinearities of devices, and degrades the spectral purity. The phase and frequency stability required for detection of the reference signal is affected by the linewidth of the laser source which is affected by intensity and frequency fluctuations. In this work, the phase noise contribution of the laser is measured to observe the degradation in purity of the clock tone short-term stability. The comparison is made between the C-band vertical-cavity surface-emitting laser (VCSEL) and distributed feedback (DFB) laser driven by a 10GHz signal generator at 10dBm power level. The single sideband phase noise at 1 kHz offset is -92.3 and -97.2dBc/Hz for VCSEL and DFB laser respectively.

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