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Operation of resonant-tunnelling-diode oscillators beyond tunnel-lifetime limit at 564 GHz

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Abstract

We present resonant-tunnelling-diode (RTD) oscillators, which are operating at frequencies up to 564 GHz. Due to heavy doping of the collector side of our diodes, the oscillators are operating beyond the tunnel-lifetime (τ) and relaxation-time (τ_{rel}) limits of RTDs. At 564 GHz we achieve $\omega\tau \approx 1.2$ and $\omega\tau_{\text{rel}} \approx 2.6$, the highest previously reported value of $\omega\tau$ at frequencies >150 GHz was ≈ 0.6 . Our study indicates that operating frequencies of RTD oscillators could be significantly increased and RTDs should be capable of operating at frequencies of several THz.