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Simple theory for the spectral linewidth of the mm-wave Josephson Flux Flow Oscillator

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A review is given of recent experimental and theoretical understandings of the spectral linewidth of the Flux Flow Oscillator (FFO). It is a long Josephson junction in which a DC bias current and a DC magnetic field maintain a unidirectional viscous flow of magnetic flux quanta. For the “bare” junction the linewidth of the electromagnetic radiation generated at the end boundary is theoretically given by the usual {\it lumped} junction expression. Experimentally, the FFO linewidth deviates significantly both in magnitude and functional dependence. This has been a challenge for over two decades. We suggest a solution based on the assumption that the bias current creates an additional magnetic field in the junction. Recent measurements with different bias configurations are presented.

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