Characterisation of Local Oscillator Noise with a 400 – 500 GHz Integrated Balanced SIS Receiver

M. P. Westig^{*}, M. Justen, K. Jacobs, <u>P. Pütz</u>, M. Schultz, J. Stutzki, and C. E. Honingh Kölner Observatorium für Submm Astronomie (KOSMA),
I. Physikalisches Institut, Universität zu Köln, 50937 Köln, Germany
* Contact: westig@.phl.uni-koeln.de, phone +49-221-470 3489
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Abstract—Excess spectral noise originating from synthesizer driven solid-state multiplier based LO chains is sometimes observed in the IF band of THz frequency SIS and HEB heterodyne receivers for radio astronomy. In order to gain a better understanding of the origin of the noise we present our measurements on the spectral noise contribution of such a local oscillator to a 400 – 500 GHz heterodyne receiver. Using an integrated balanced SIS mixer with two separate IF output ports we are able to characterize the LO noise contribution as a function of the IF frequency for various RF frequencies. We investigate how changes in the LO operating conditions, such as the saturation level of the power amplifier in the chain, affect the measured spectral noise power of the receiver IF. Comparison measurements of the synthesizer driven LO with one using a Gunn oscillator as source are presented as well.