

LOW NOISE SINGLE SIDEBAND SIS MIXERS FOR MM AND SUBMILLIMETER RADIO ASTRONOMY

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We present our experience of the last years in development of the practical single sideband SIS receivers for the 80 GHz - 400 GHz band and their operation at the IRAM radio telescopes.

The receivers with a sideband rejection and extremely low noise, approaching the quantum limit, are required for optimisation of the spectral observations at the modern radio telescopes in the mm and sub millimetre bands. The tuning using a single backshort for rejection of the image sideband inside of a mixer allow to obtain a minimum degradation of the SIS receiver noise temperature.

The different types of the wave guide single sideband SIS mixers are developed for the 0.8 mm, 1.3 mm and 3 mm bands. The minimum SSB receiver noise ranges from 30 K at 85 GHz to 48 K in the 0.8 mm band. For the first time the SSB receiver noise as low as $3h\nu/k$ with the is demonstrated at the radio telescope with an SIS mixer.

After an analysis of the requirements for optimisation of the receivers for the radio astronomy applications the mixer design and operation will be presented. We discuss the HEMT/SIS problem in application to the 3 mm band and present the first laboratory results with 25 K SSB mixer in the 3 mm band.