

A Multibeam 2SB SIS Receiver at 3mm Wavelength

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Abstract—We have developed a 3x3 multi-beam receiver for Delingha millimeter telescope, the major open facility for millimeter-wave radio observation in China. The receiver has been successfully put into observation since the end of 2010 and its considerable enhancement of mapping speed has been proved. The receiver employs 2SB SIS mixers with a typical SSB noise temperature 50K and sideband separation ratio over 10dB in the 85-116GHz frequency range. The SIS mixers have a nearly 50 Ohm output impedance enabling direct connection of the cryogenic low noise amplifier without IF isolator. The nine pixels are pumped by a single LO source distributed by a 2-stage cascaded power dividers realized by 6-branch line directional couplers. The LO is generated by a frequency synthesizer followed by an amplifier-multiplier module providing output power over 10mW across the RF band. The IF band is centered at 2.64GHz with bandwidth 1GHz allowing simultaneously observing three CO lines ($C^{18}O$, ^{13}CO and ^{12}CO). The nine pixels yield 18 independent IF outputs. Each of them is processed by a digital FFT spectrometer with 200MHz-1GHz reconfigurable bandwidth and 16384 channels. In this symposium the design and the performance of this 2SB multi-beam receiver will be presented in detail.



Fig. 1

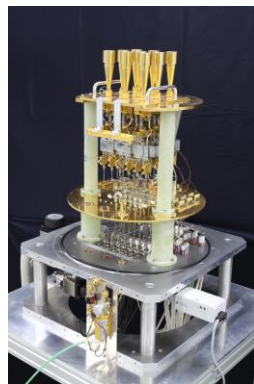


Fig. 2

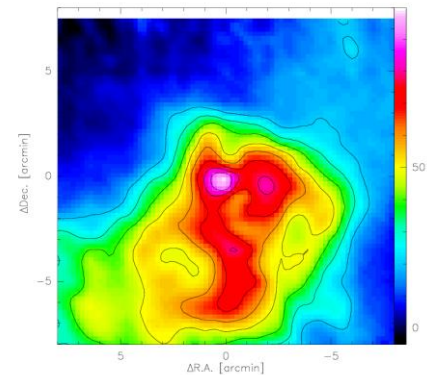


Fig. 3

Fig. 1 The photo of the whole receiver system.

Fig. 2 The photo of the front-end inside Dewar.

Fig. 3 An observation example (S106 12CO J=1-0) using new receiver system.