Recent activities on Front End D&D at SRON

A. Baryshev, R. Hesper, W. Wild

26-July 2001

1. Band 9 (600 - 720 GHz) Mixer development

*Quasi-optical mixers*

- 5 batches of devices have been produced based on Nb technology
- rf tests (FTS) has shown good band coverage
- DSB noise temperature of 200 K uncorrected in the middle of the band and 300 K at the band edges
- Mask set revision has been made
- We are waiting for a new batch as the result

*Waveguide mixers*

- 15 batches of old SRON design have been made so far
- 4 batches have been made recently (normal Nb technology)
- we received a newly made complete mixer block
- device from the latest batch covers most of the rf band
- The wide band IF experiments both with NRAO amplifier and YEBES amplifier being worked on.
- New maskset is being prepared which will include:
  
  Standard Nb technology
  NbTiN/Nb-AlOx-Nb/Al technology
  AIN barrier technology

  to address rf bandwidth and sensitivity at higher end of rf band.
- New software (Microwave Studio) is being used for optimization of current waveguide mixerblock

2. Industrialization

- Test run of mixer back pieces (most critical components) has been done in a company. Six pieces have been produced with high precision in a fully automatic way. The measurement of different parameters shows excellent to satisfactory reproducibility of parameters. Collaboration with the company continued.

3. Optics band 9 development

- A preliminary band 9 layout has been proposed at PDR
- Measurement of antenna beam pattern of quasi-optical mixer (phase and amplitude) are ongoing in collaboration with IRAM
Photograph of newly made waveguide band 9 ALMA mixer. From left to the right: horn with H-field conductors, back piece, fixing nut.

Photograph of made 5 back pieces made in an automatic way
Zoom-in of automatically made back piece.

FTS response of SIS15-19 A33 sample in new ALMA waveguide mixer

Heterodyne measurement results for new ALMA waveguide mixer