

# Recent activities on Front End D&D at SRON

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## 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-AlO<sub>x</sub>-Nb/Al technology  
AlN 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

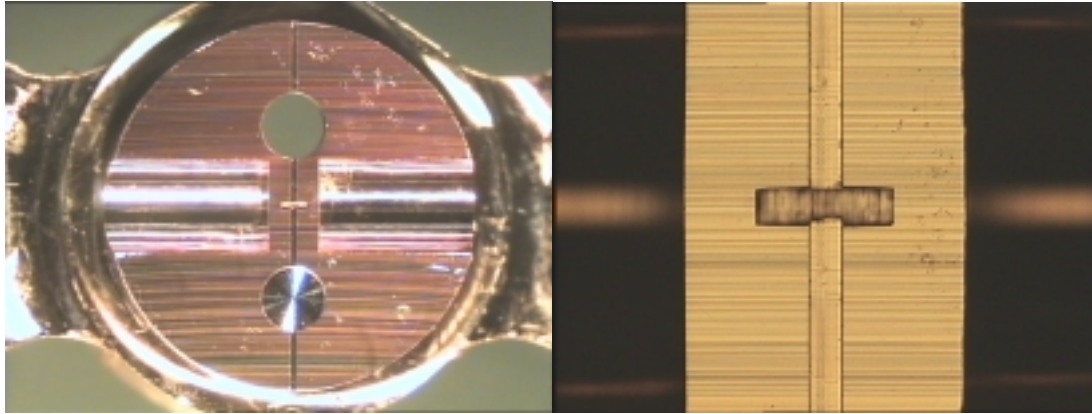
- A preliminary band 9 layout has been proposed at PDR
- Measurement of antenna beam pattern of quasi-optical mixer (phase and amplitude) are ongoing in collaboration with IRAM



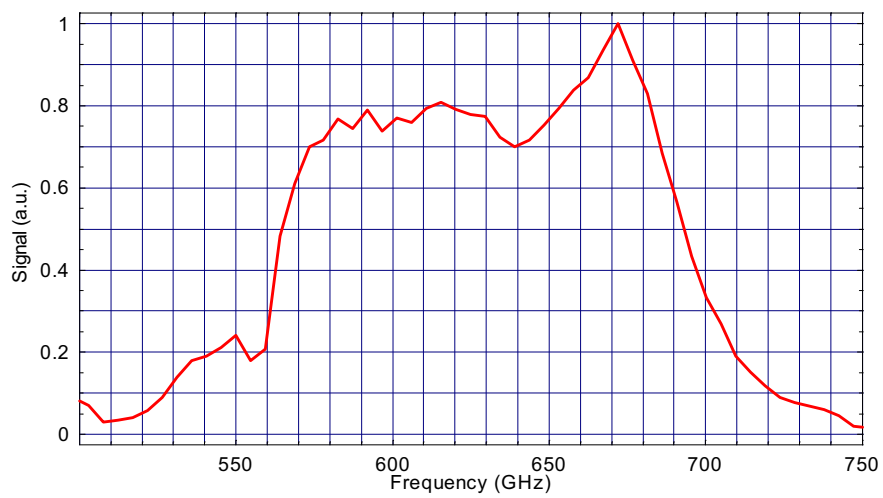
**Photograph of newly made waveguide band 9 ALMA mixer. From left to the right: horn with H-field conductors, back piece, fixing nut.**



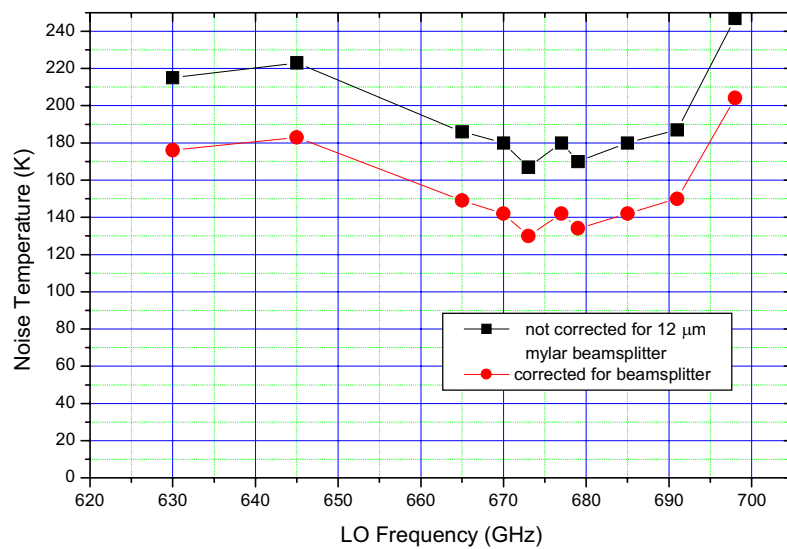
**Photograph of made 5 back pieces made in an automatic way**



**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**