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Wide band instantaneous coverage receiver concept for ALMA

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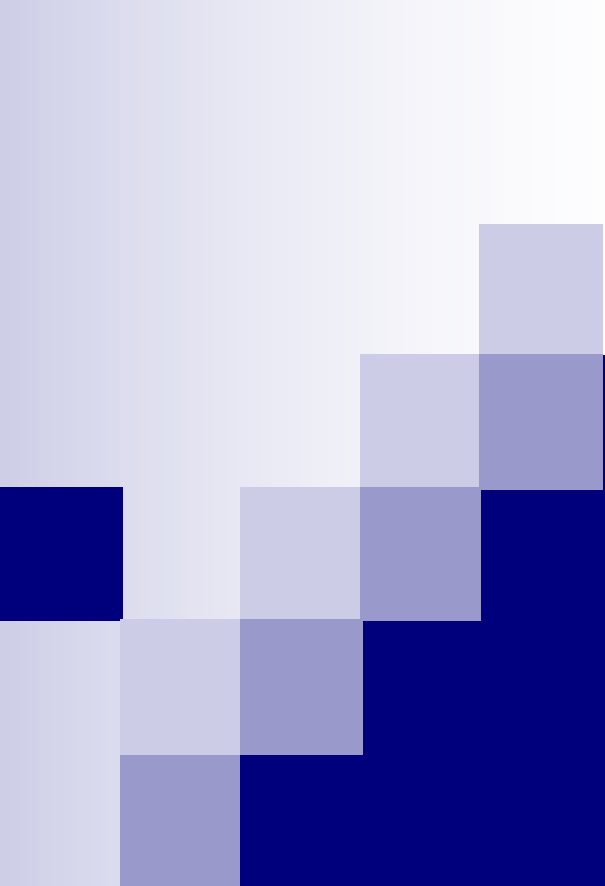
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Wide band instantaneous coverage receiver concept for ALMA

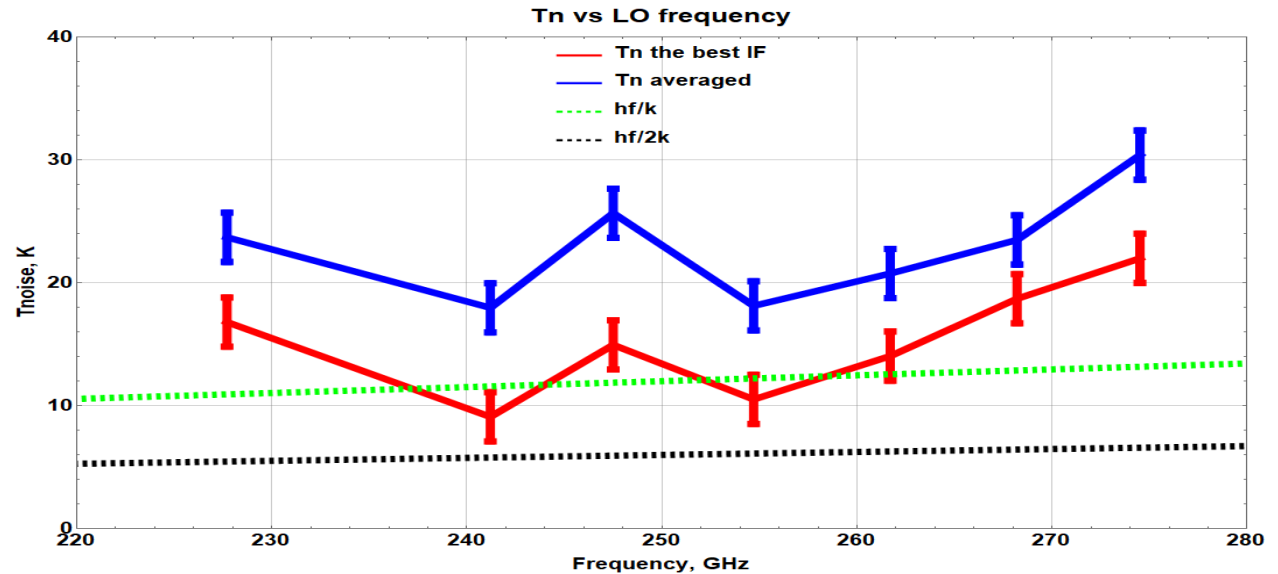
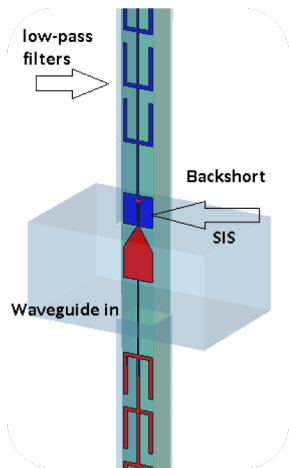
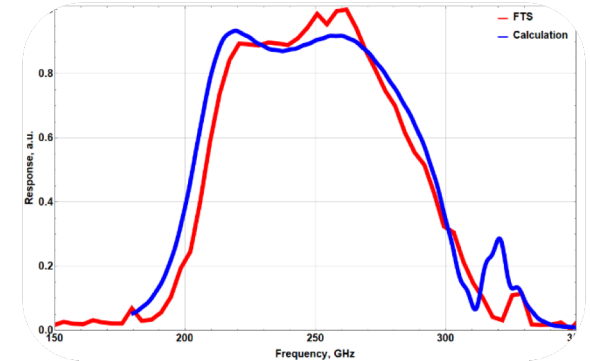
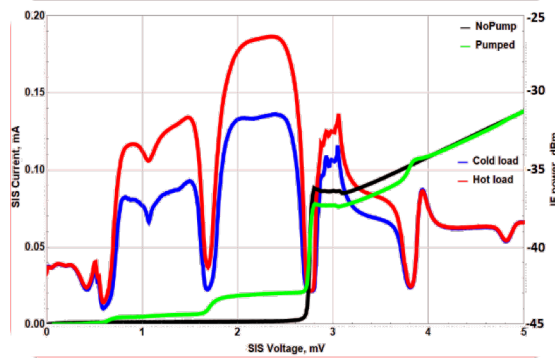
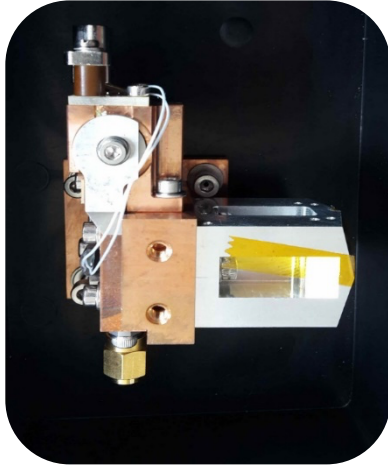
Andrey Baryshev, Kirill Rudakov, Ronald Hesper, Andrey Khudchenko, Daniel Montofre, J. Adema, Rob de Haan Stijkel, Pavel Dmitriev, Valery Koshelets, M. Bekema and F.P. Mena

Improve ALMA!

How can we improve current ALMA system

- Improve sensitivity of SIS mixer (Quantum limited performance @ 260 GHz)
- Improve instantaneous RF bandwidth (dual frequency operation = 1st step)
- Ultra wide instantaneous coverage = **ultimate receiver** for ALMA

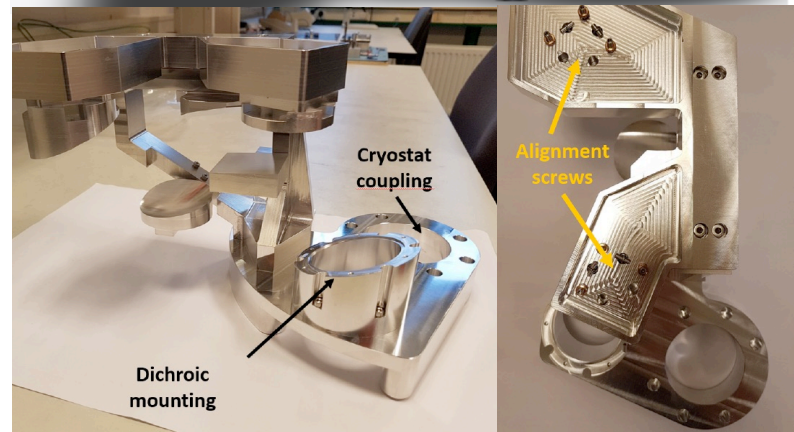
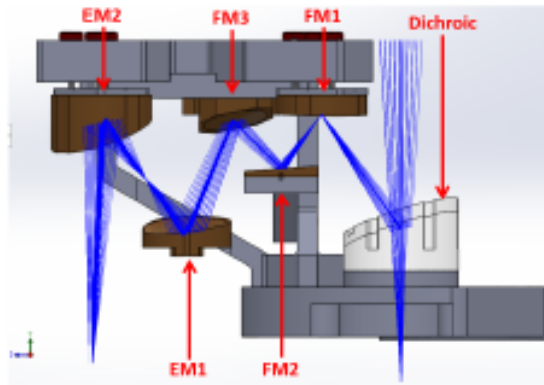
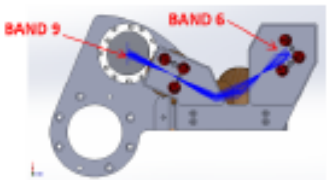
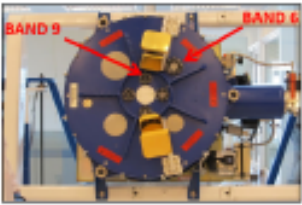
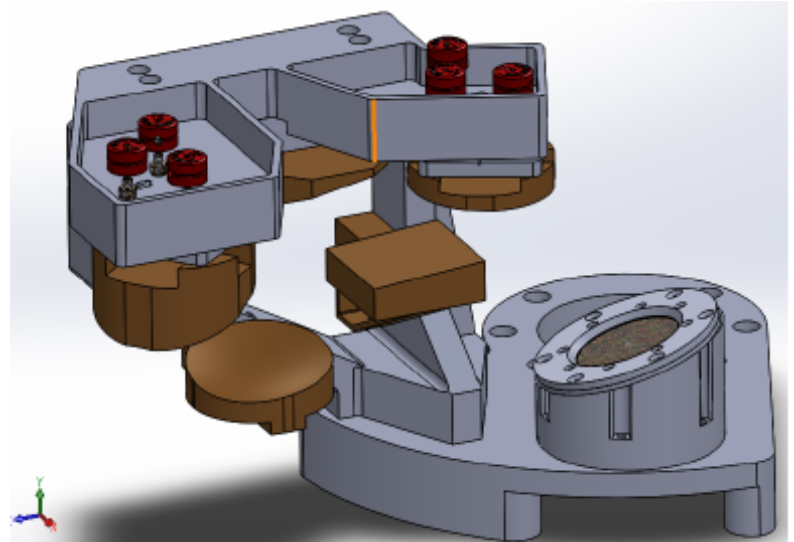
Attacking quantum limit $hf/(2k)$



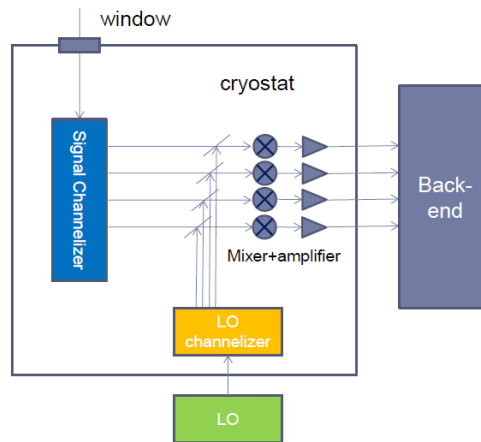
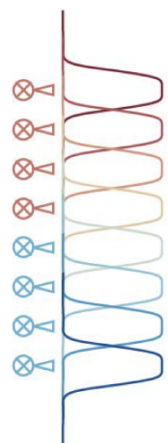
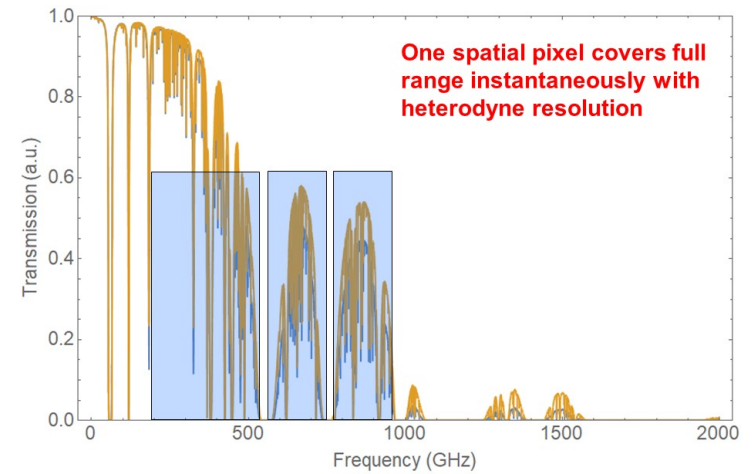
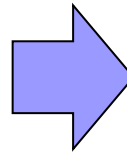
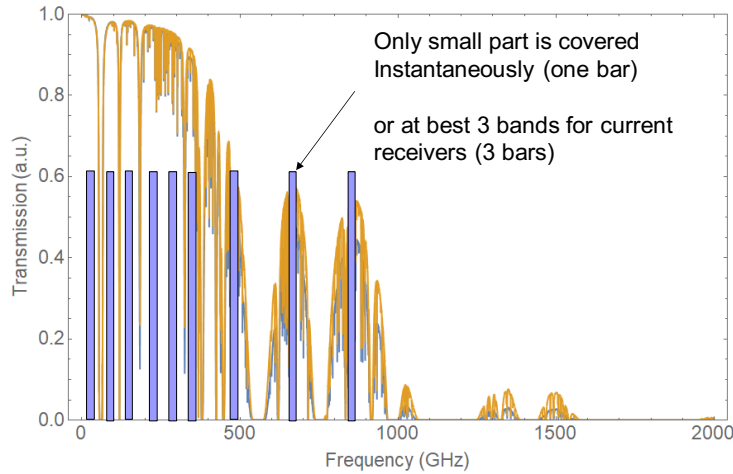
Dual frequency ALMA B6/9

Benefits:

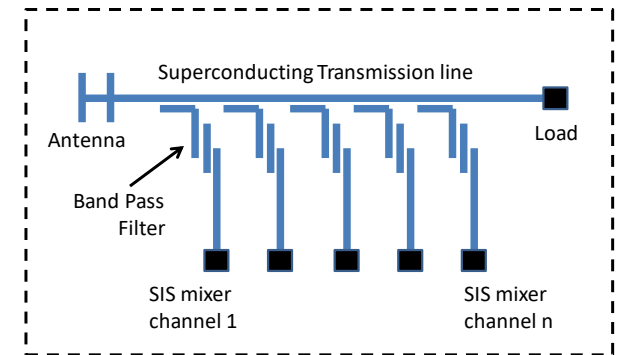
- Improved phase calibration
- Enabling the highest resolution imaging with ALMA
- Observation of transient phenomena
- High redshift resolved cosmic star formation history
- **No changes in ALMA system**



Frequency Array Receiver



Quasi-optical system



An on-chip system



Key advantages

- All atomic/molecular lines are available in one go in high resolution
- Much more information is available for atmospheric transmission correction
- Possibility to study large spectral features (dust)
- Possibility to exclude atmospheric line forest – background limited total power performance
- Blind red shifted CII, CO, CI search (SUPERSPEC, DESHIMA science)
- Ultimate ALMA/ATLAST front-end backend