



I N A F



Band 2+3 warm optical characterization

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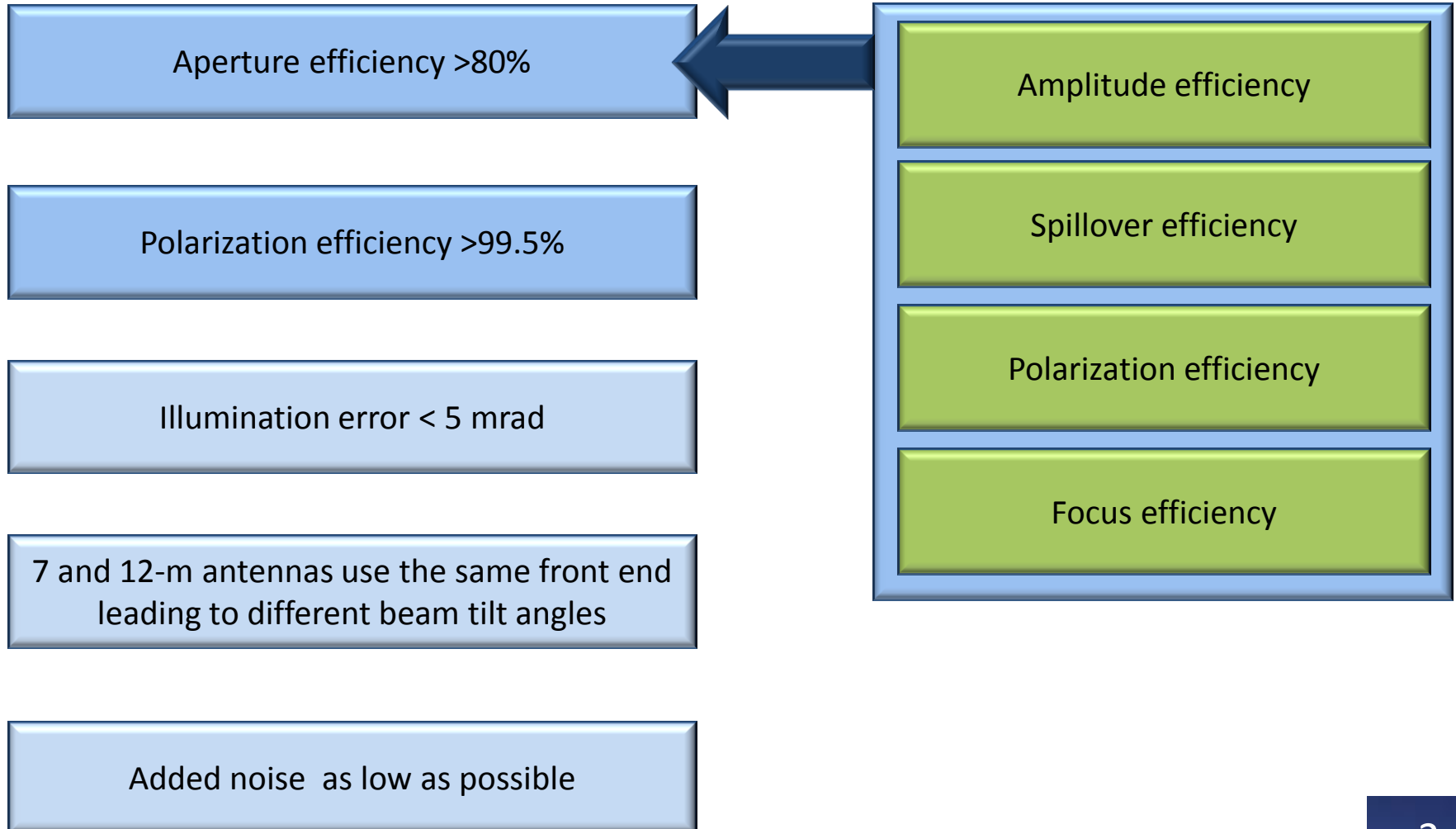


Presentation overview

1. Introduction
2. Measurement system
3. Phase-A results
4. Phase-B results
5. Conclusions

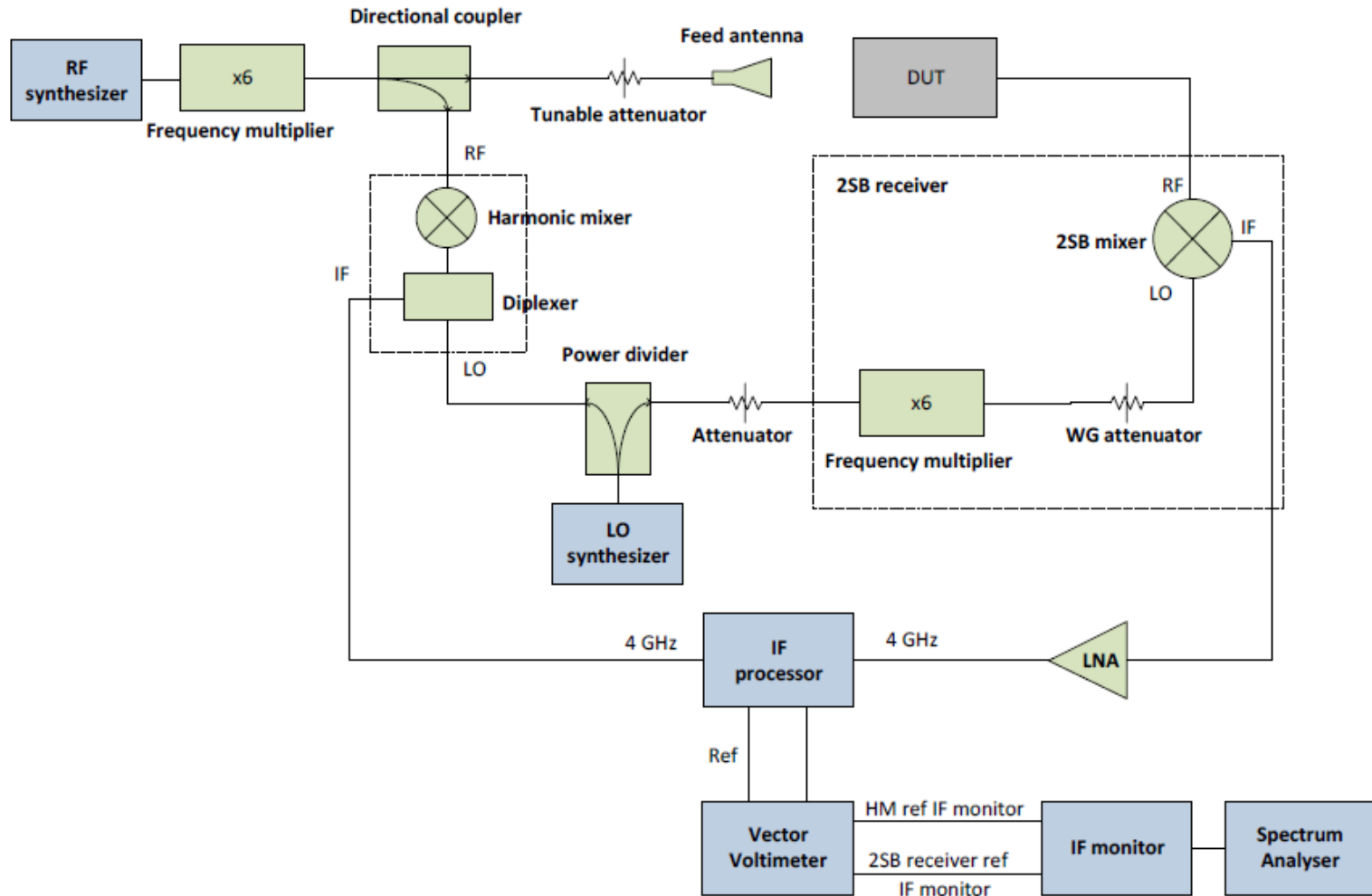
Introduction

ALMA requirements



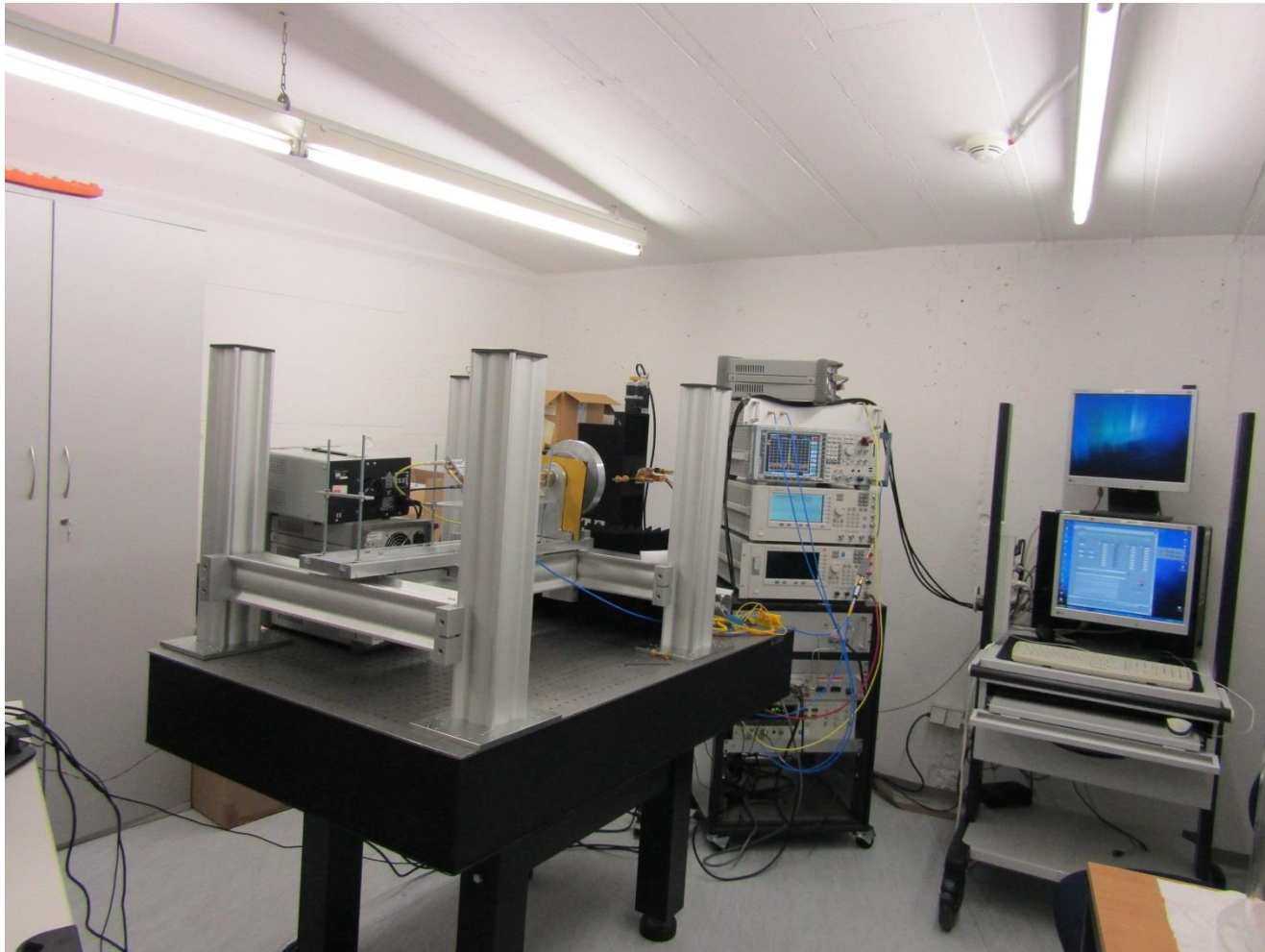
Measurement system

Scheme



Measurement system

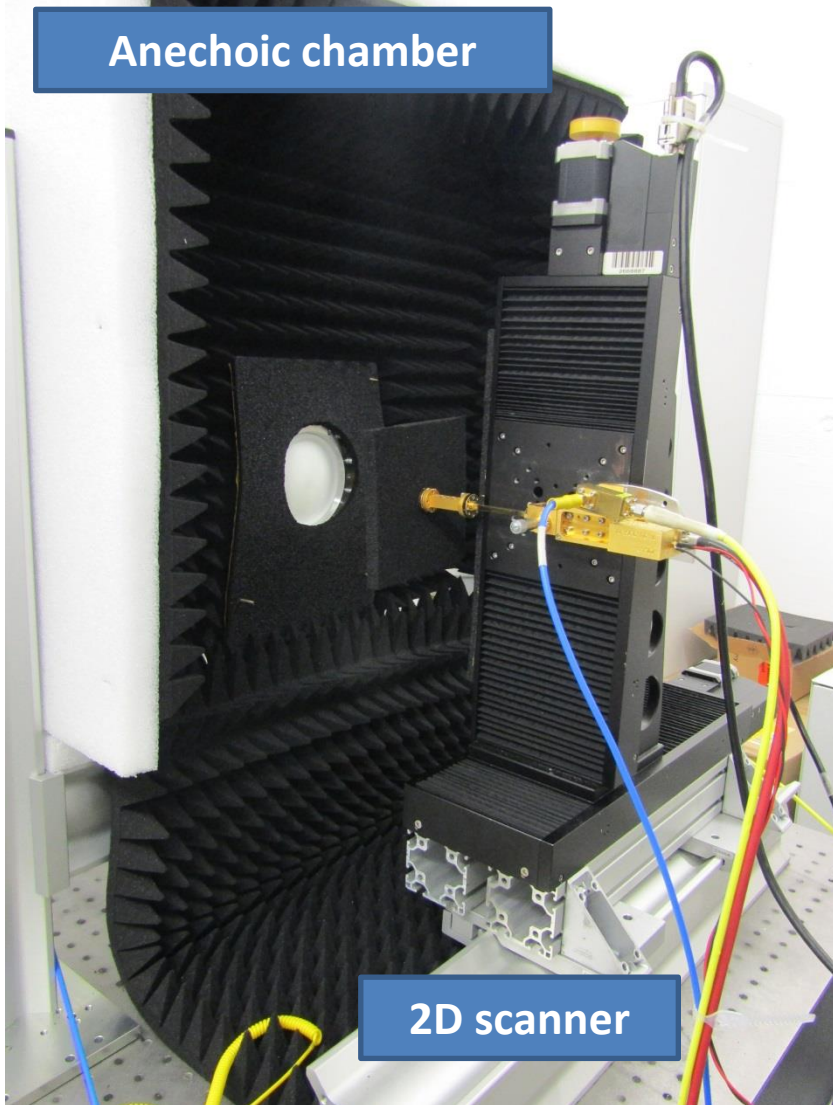
Lab configuration



Measurement system

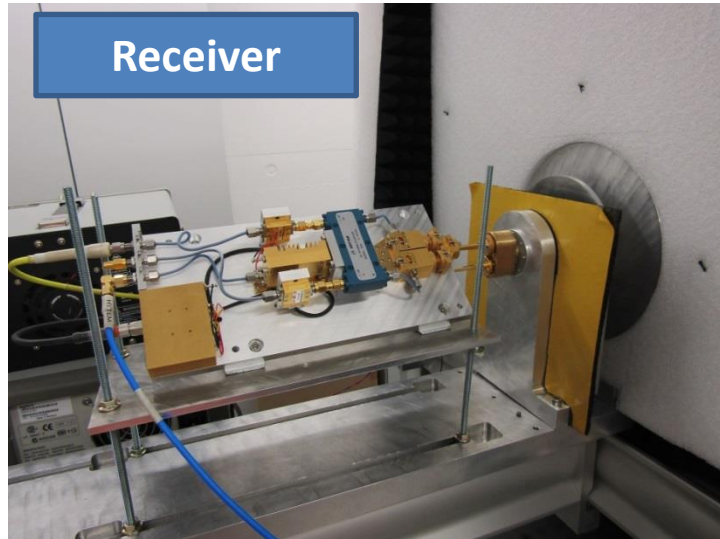
Setup

Anechoic chamber

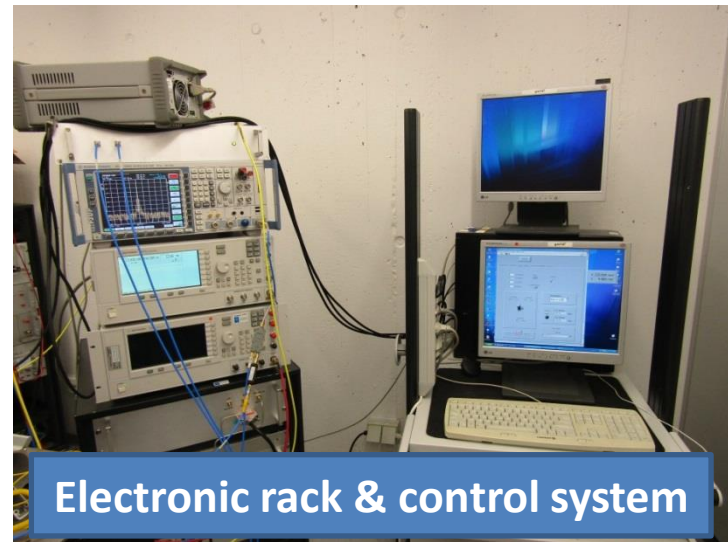


2D scanner

Receiver

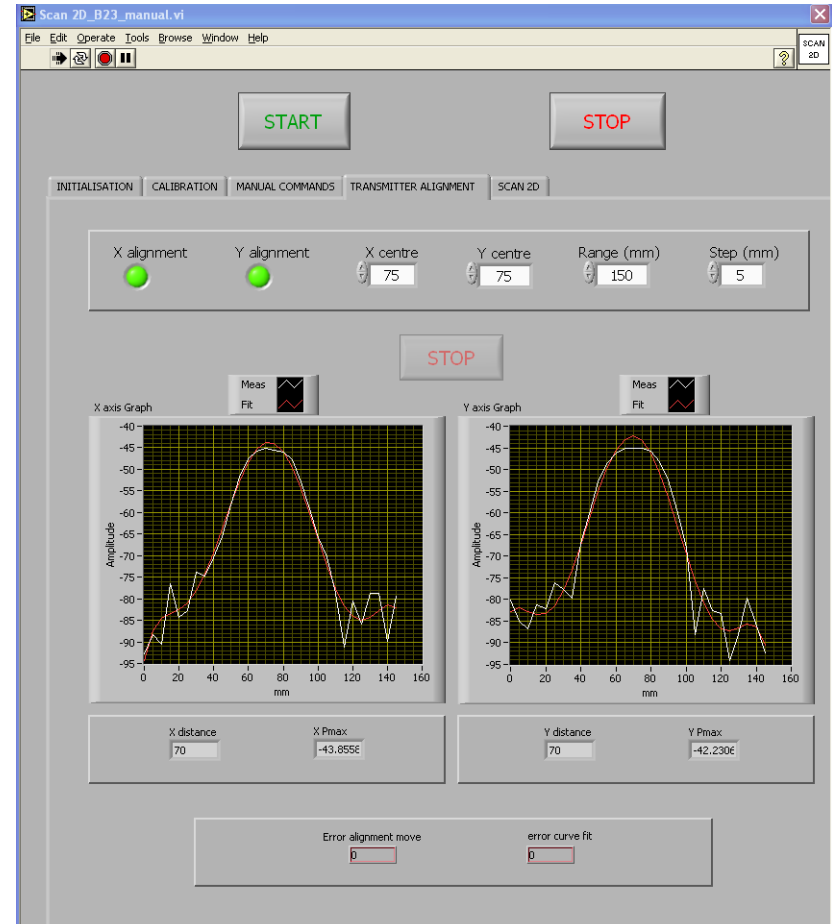


Electronic rack & control system



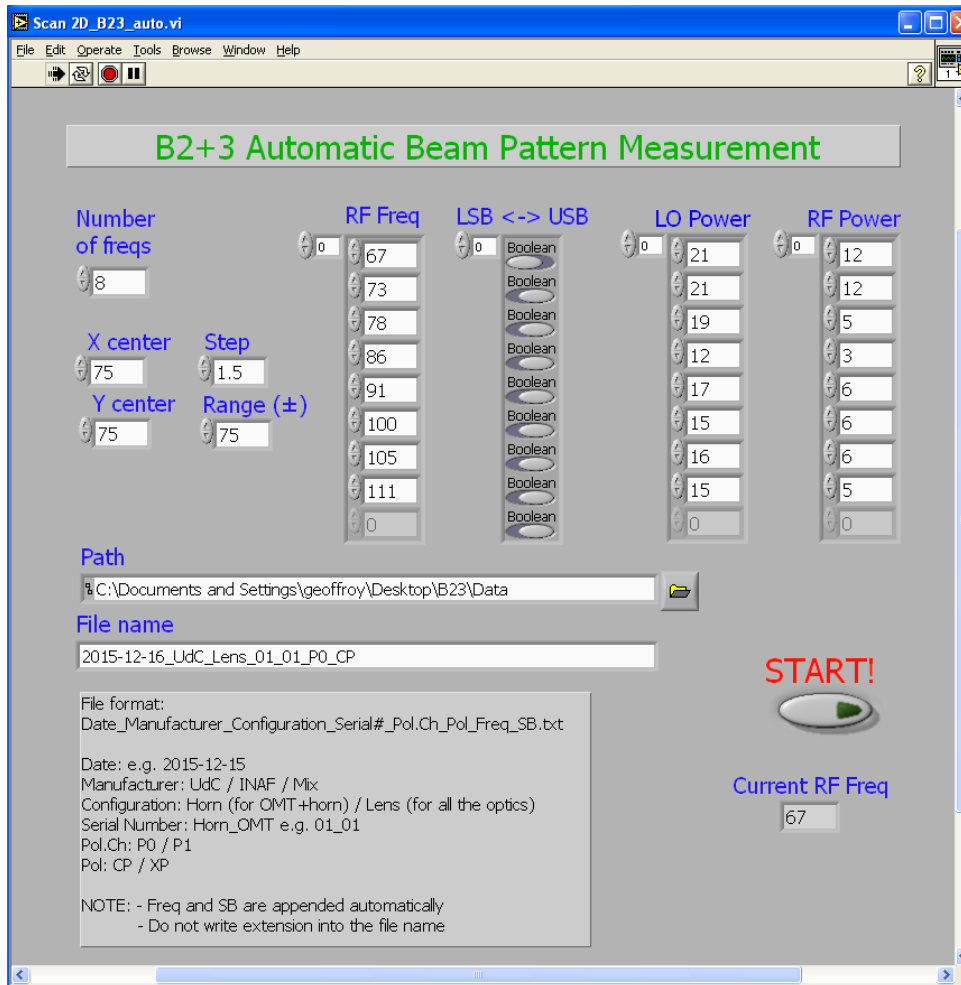
Measurement system

Manual Labview interface



Measurement system

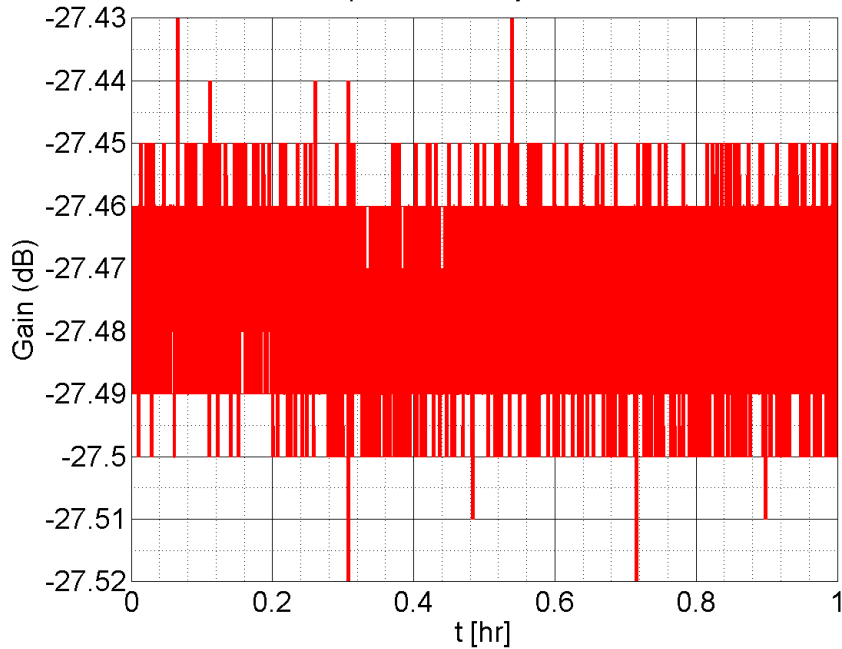
Automatic Labview interface



Measurement system

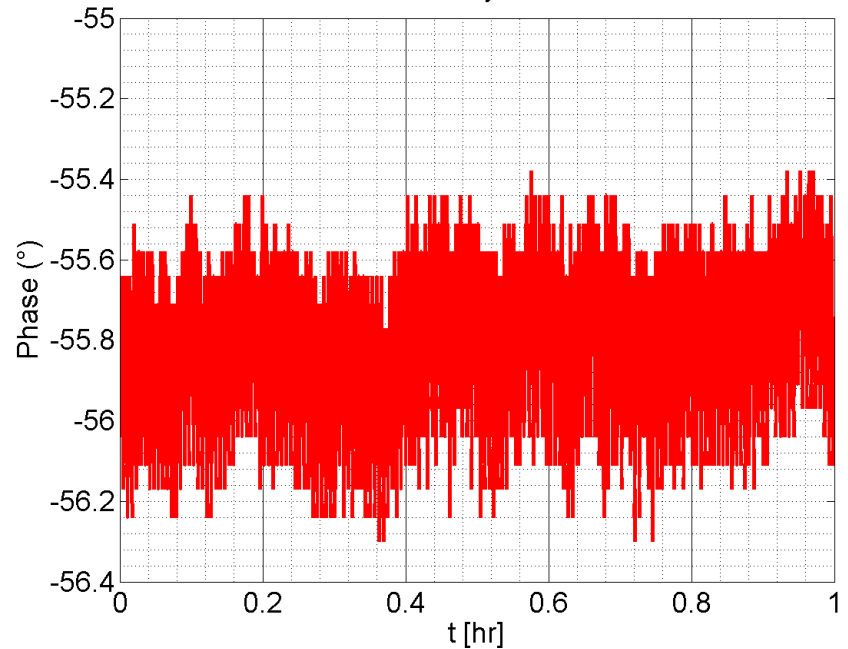
Amplitude and phase stability

Amplitude stability at 92 GHz



-27.46 ± 0.03

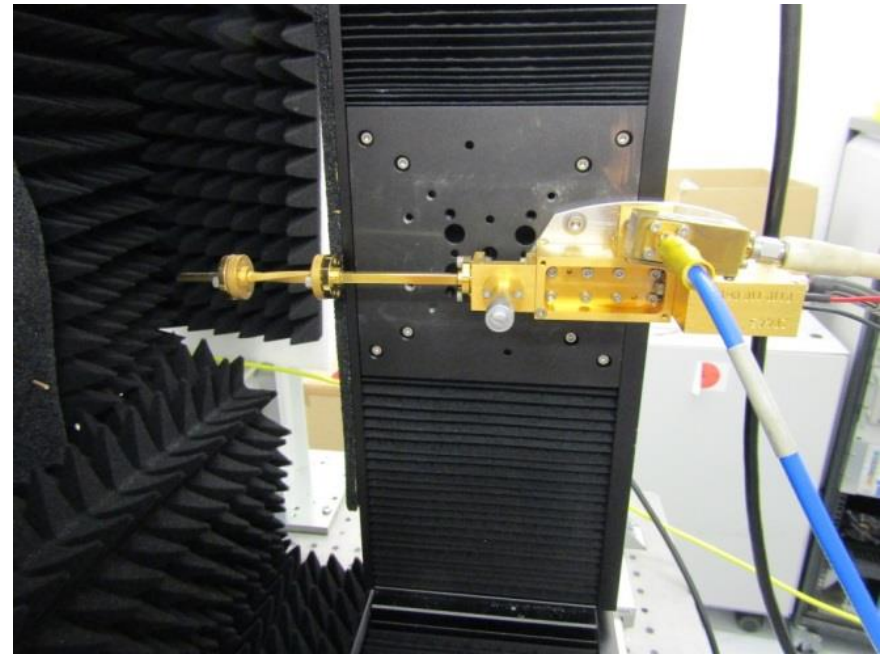
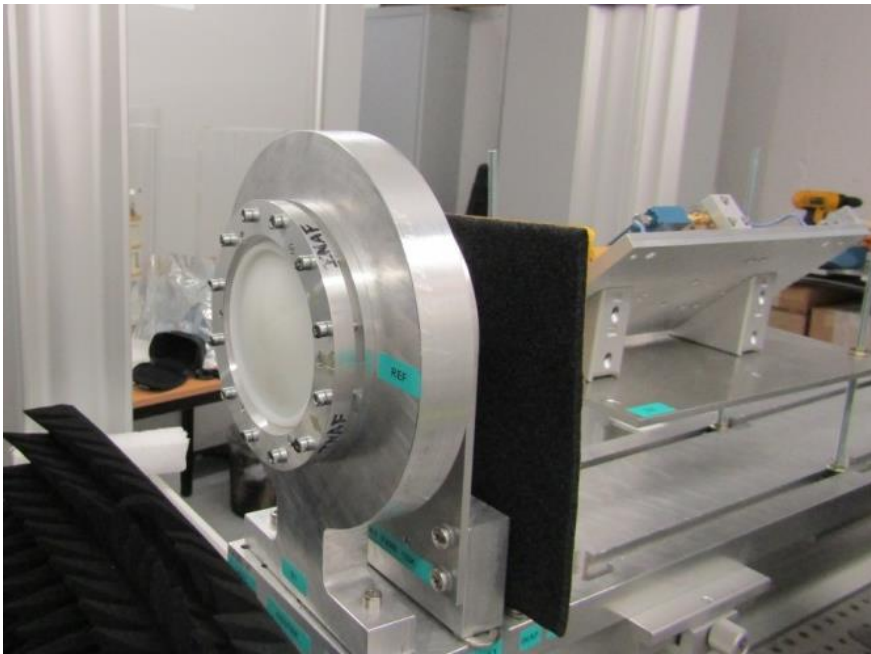
Phase stability at 92 GHz



-55.73 ± 0.33

Measurement system

Error sources

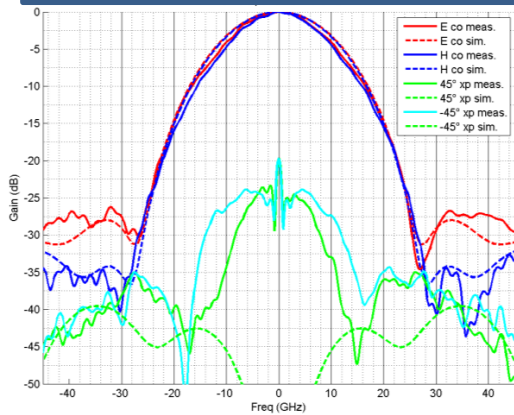


No very accurate alignment

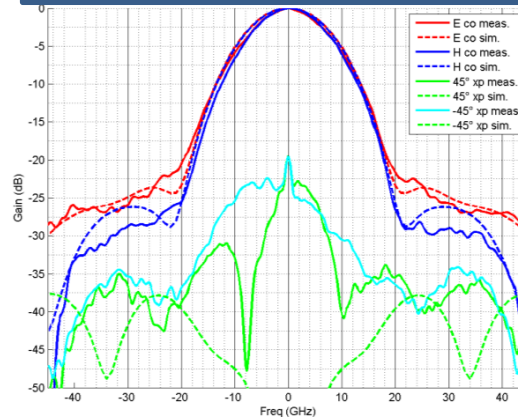
Results Phase-A

Horn patterns

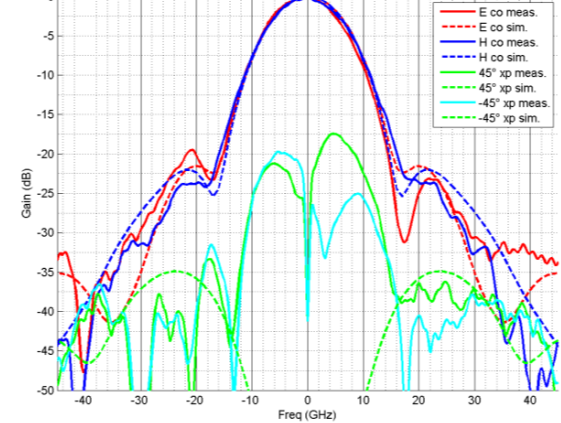
UChile, P0, 73 GHz



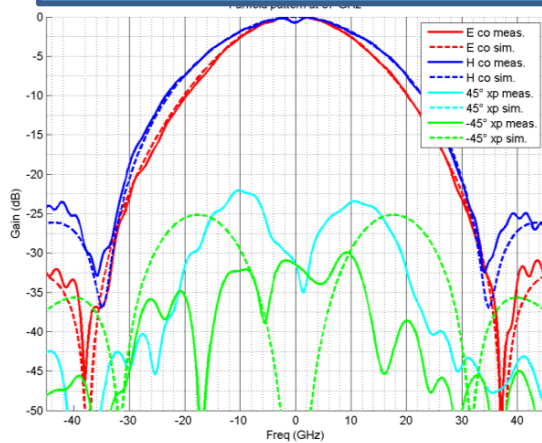
UChile, P0, 92 GHz



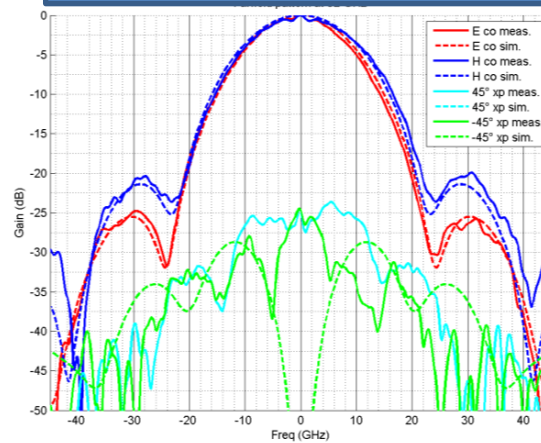
UChile, P0, 111 GHz



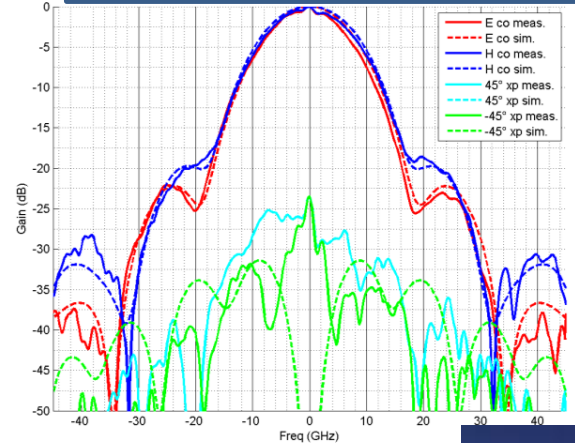
INAF, P0, 73 GHz



INAF, P0, 92 GHz



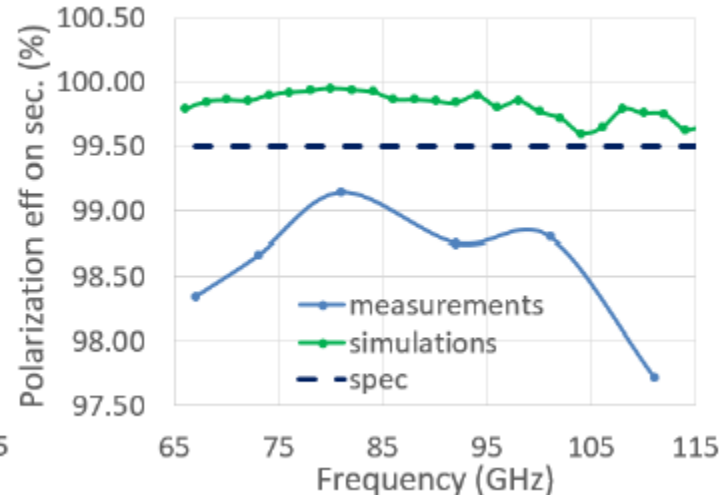
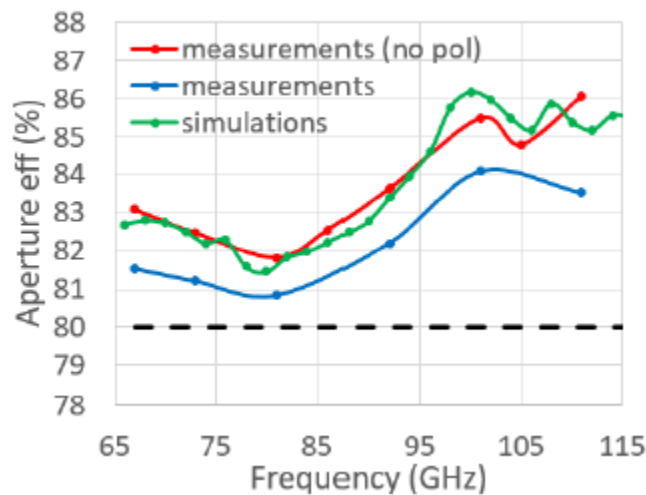
INAF, P0, 111 GHz



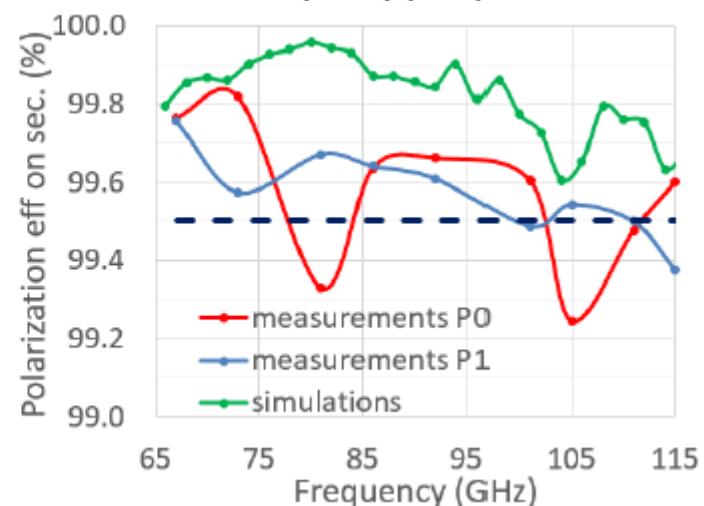
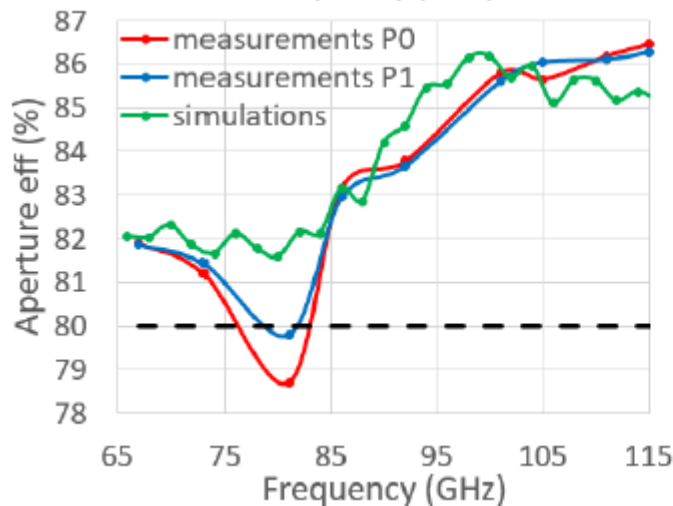
Results Phase-A

Simulated v/s measured efficiencies, No 110-K filter

UChile

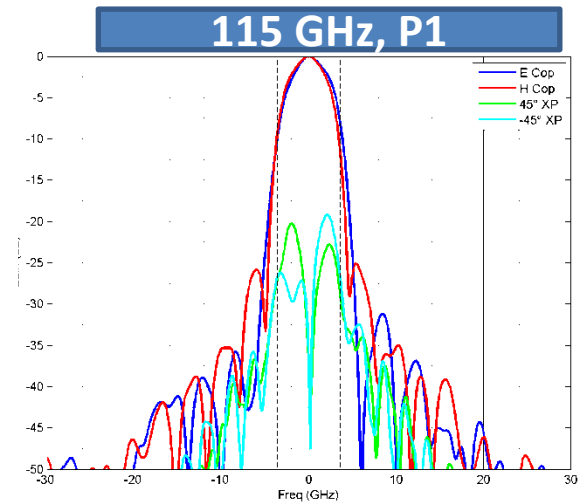
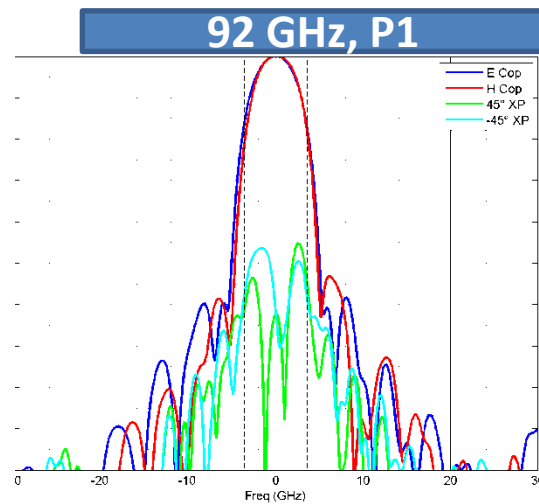
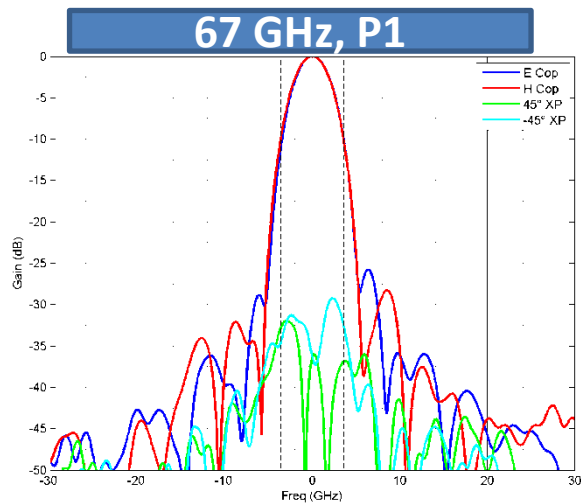
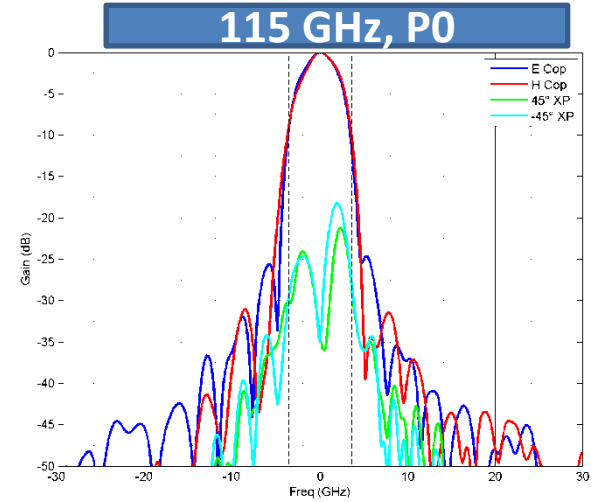
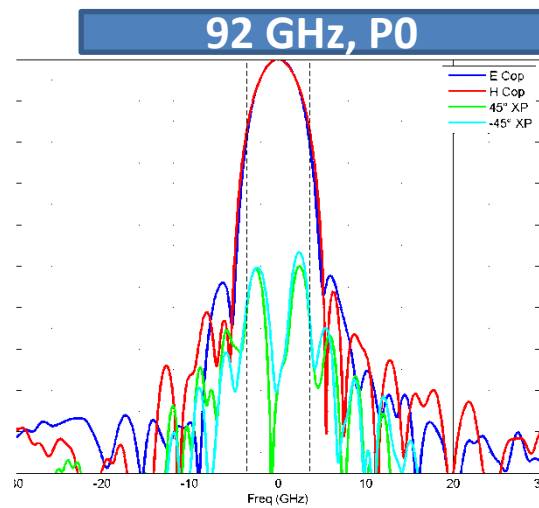
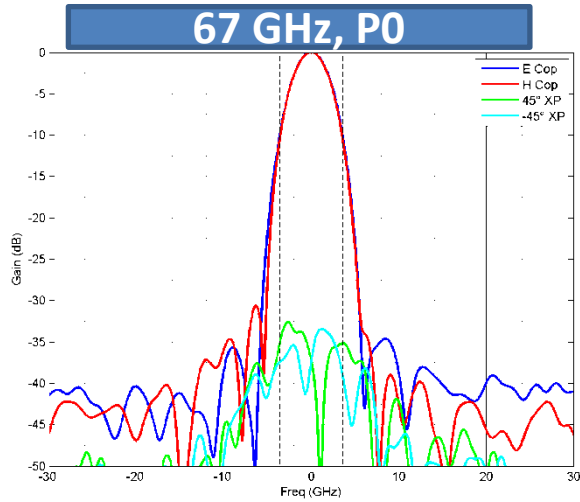


INAF



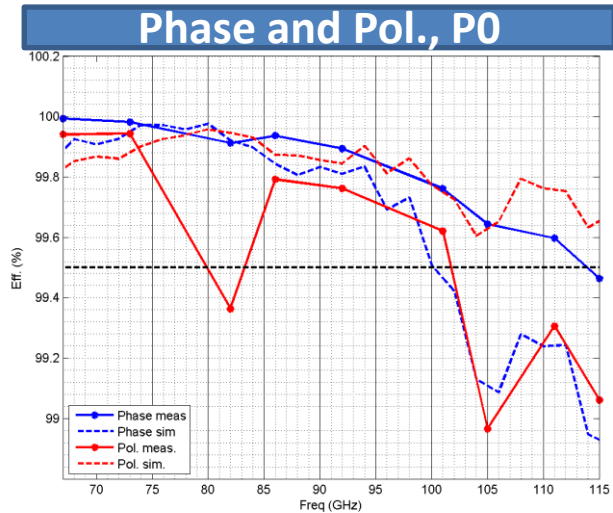
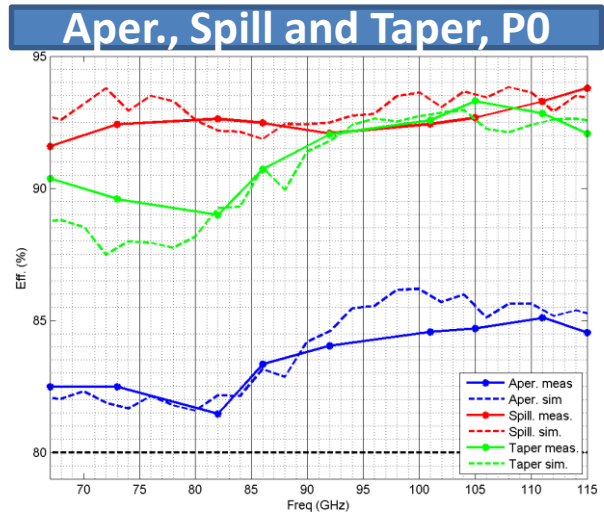
Results Phase-B INAF configuration

OMT+Horn+Lens far-field patterns

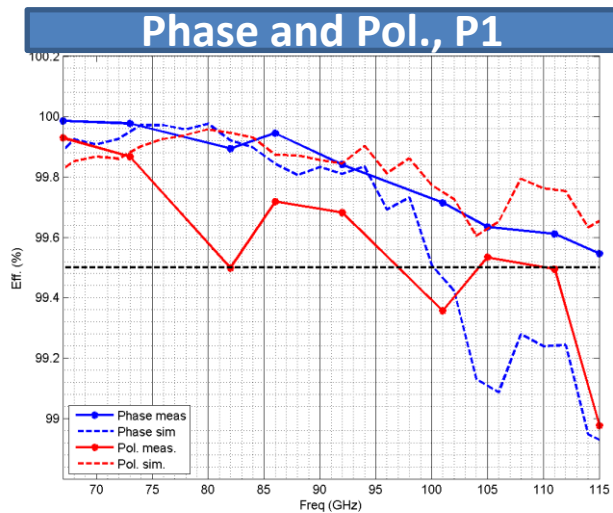
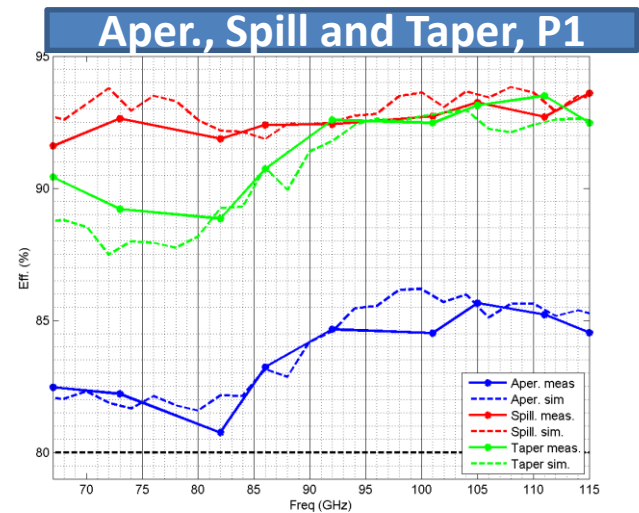


Results Phase-B

Simulated v/s measured efficiencies, No 110-K filter

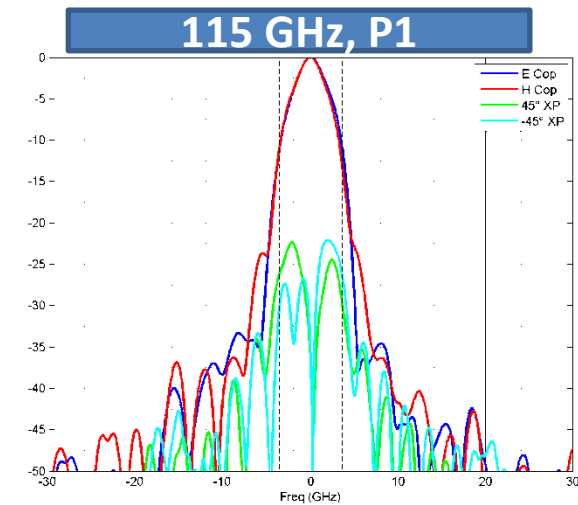
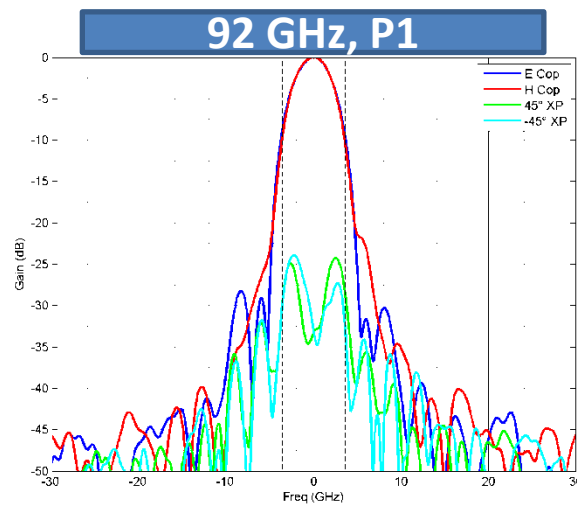
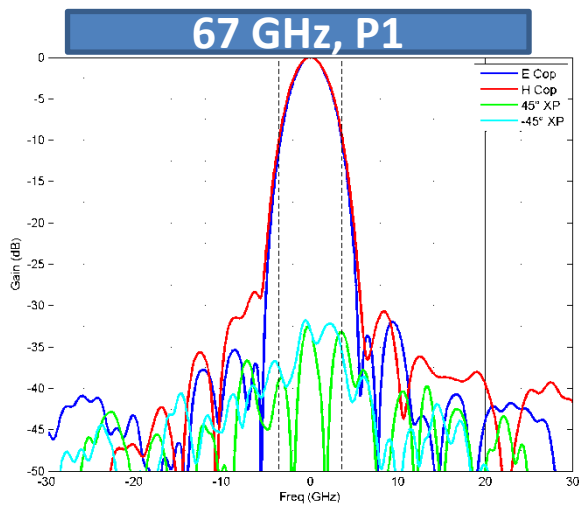
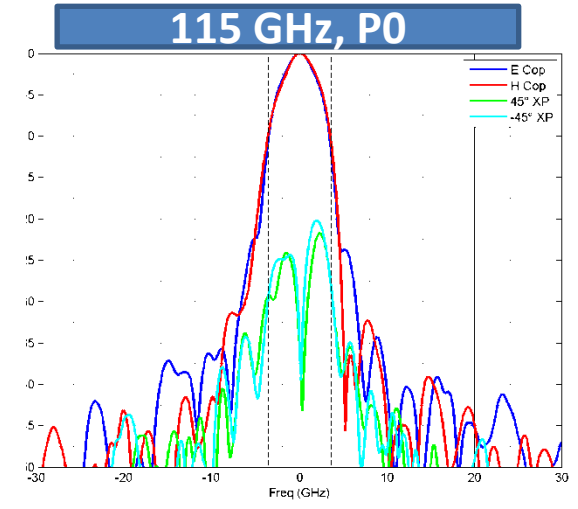
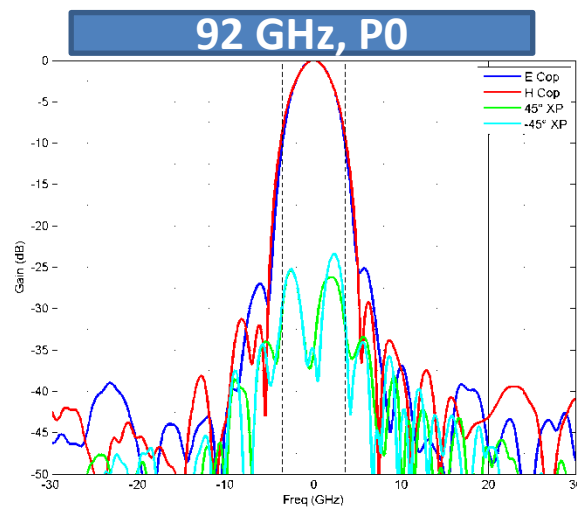
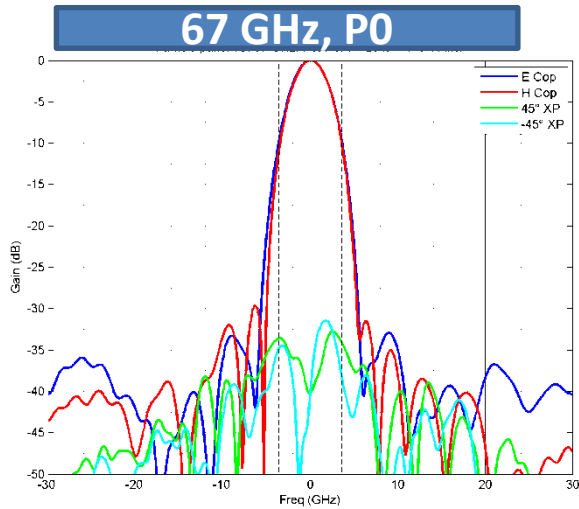


Polarization efficiency
Out of spec!



Results Phase-B INAF configuration

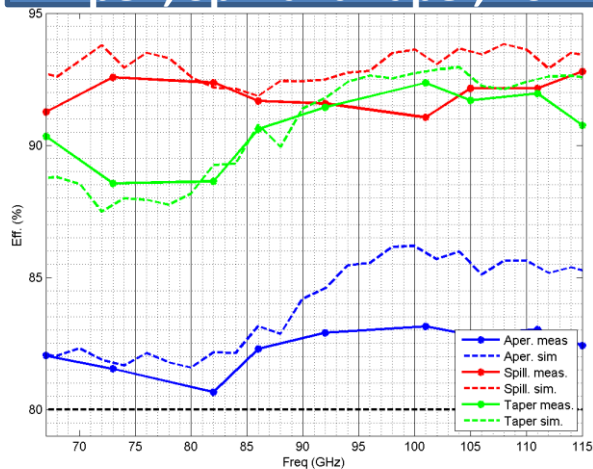
Full system far-field patterns



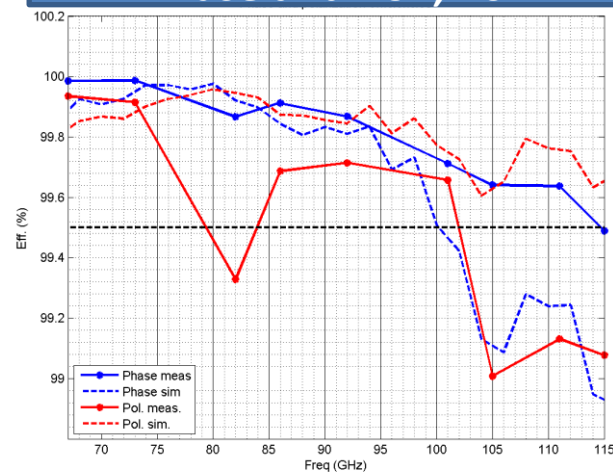
Results Phase-B

Simulated v/s measured efficiencies, full system

Aper., Spill and Taper, P0

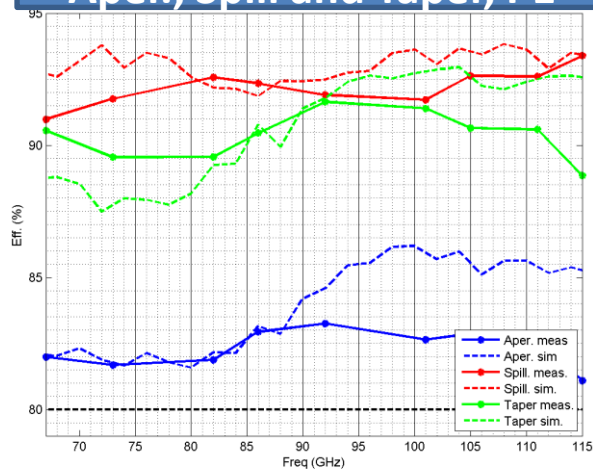


Phase and Pol., P0

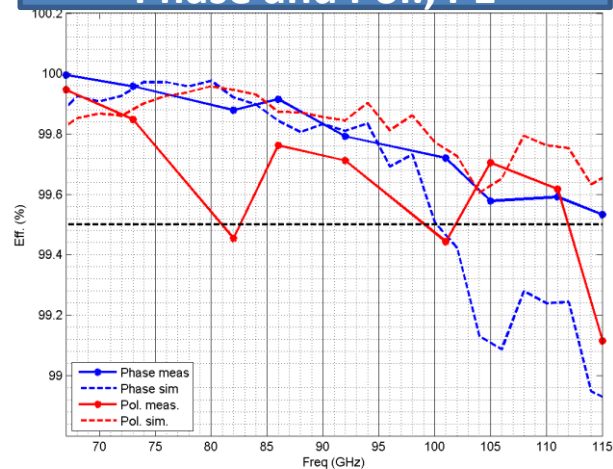


Degradation due to the 110-K filter in aperture eff. at the highest frequencies
~2%

Aper., Spill and Taper, P1



Phase and Pol., P1



No degradation due to the 110-K filter in polarization eff.

Conclusions and further work

- We successfully characterized a full optical system of ALMA band 2+3.
- It was demonstrated that it is possible to achieve an excellent performance in aperture efficiency.
- It is necessary to understand and improve the crosspolar performance.
- The measurements show good agreement with simulations.
- It is necessary to further optimize the measurement system.
- System including UChile devices will be characterized in the coming weeks.



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