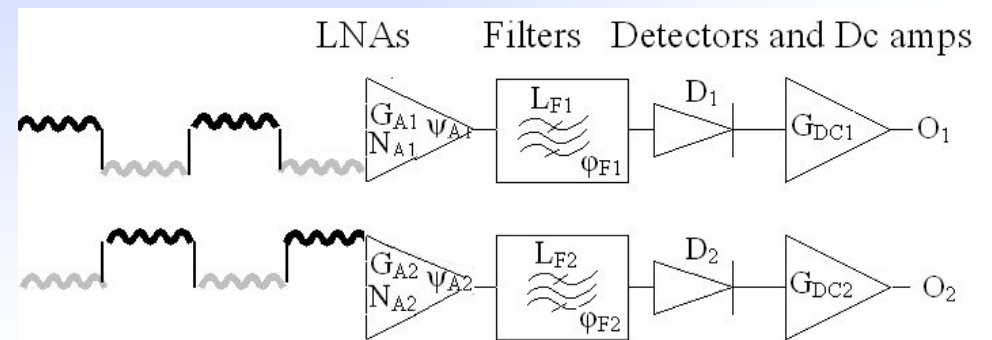
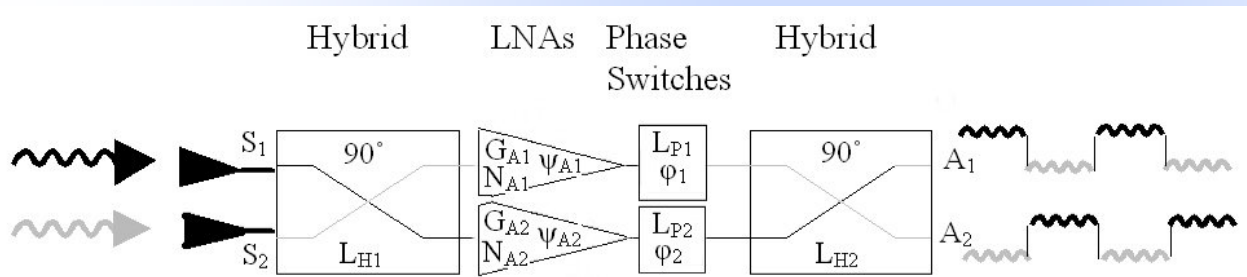


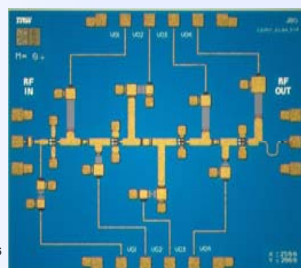
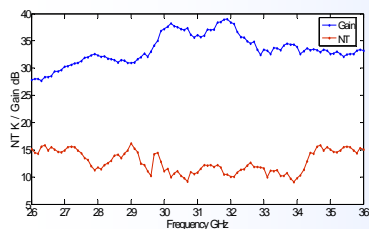
Ka Band MMIC Radiometer

Experiences and future in RA

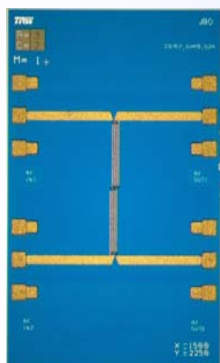
- 10-beam array
- Cryogenic operation
- Custom designed InP MMICs at front-end



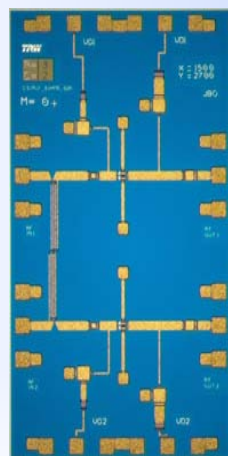
Front-end module (FEM)



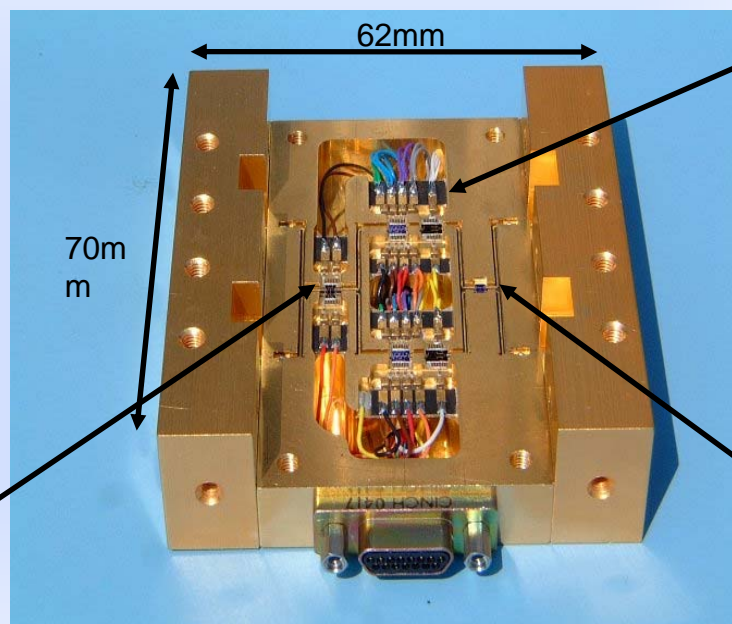
MMIC low noise amplifier



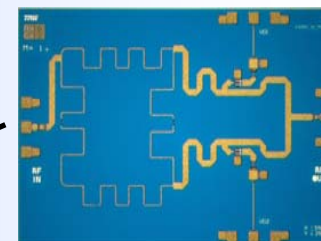
Input passive hybrid coupler



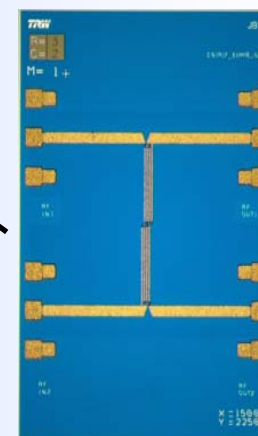
Input active hybrid coupler



Low noise radiometer front-end receiver

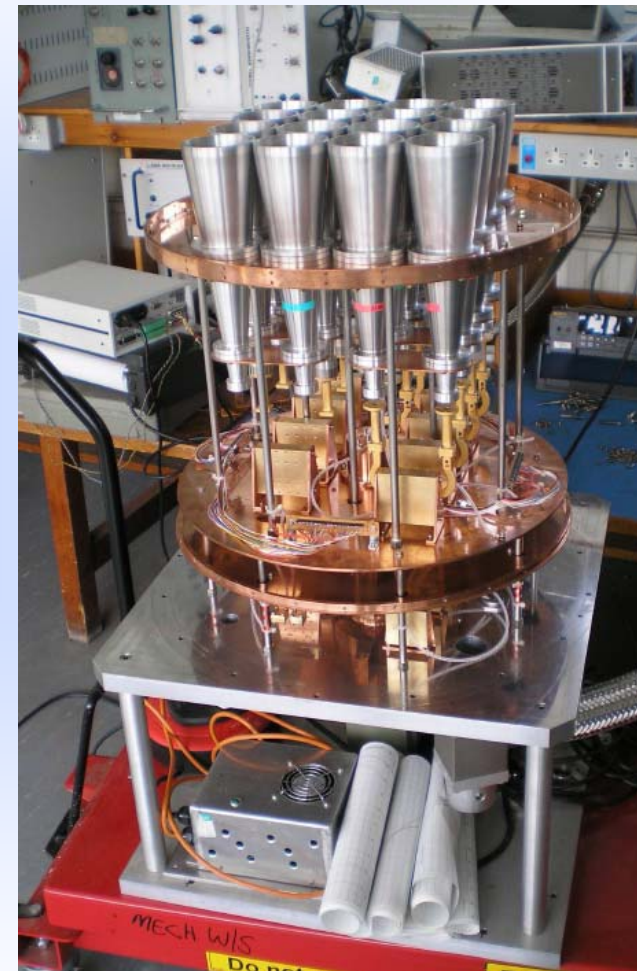
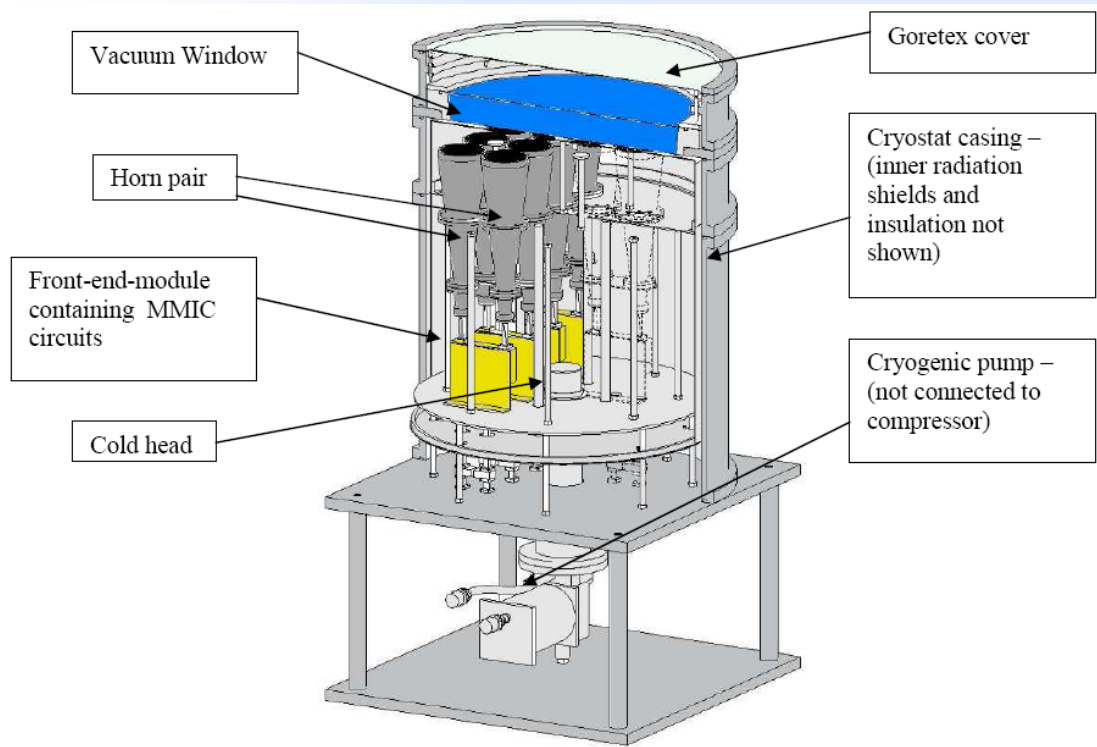


0 / 180° phase switch

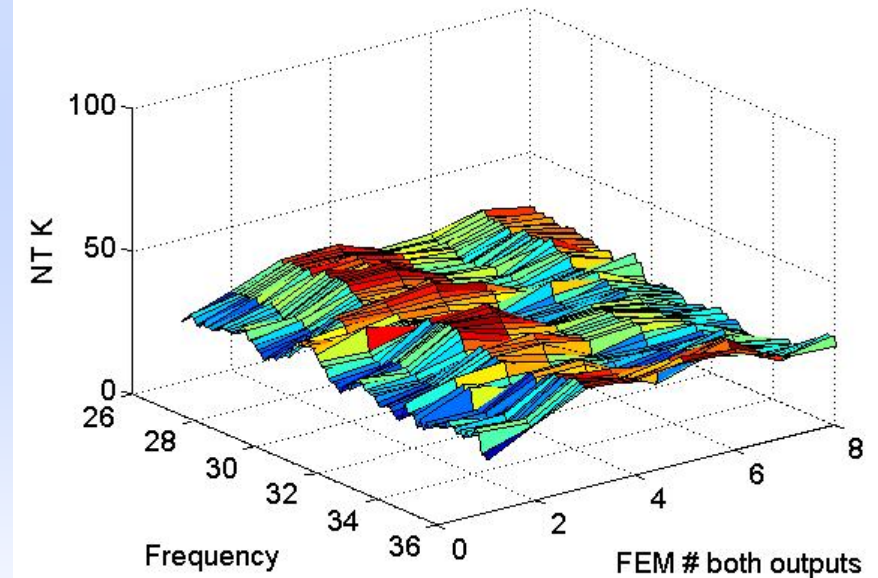
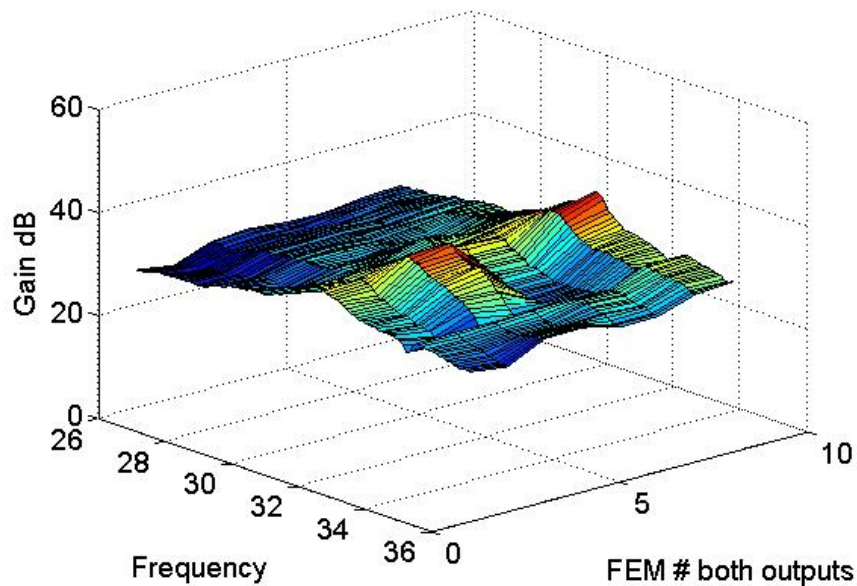


Output passive hybrid coupler

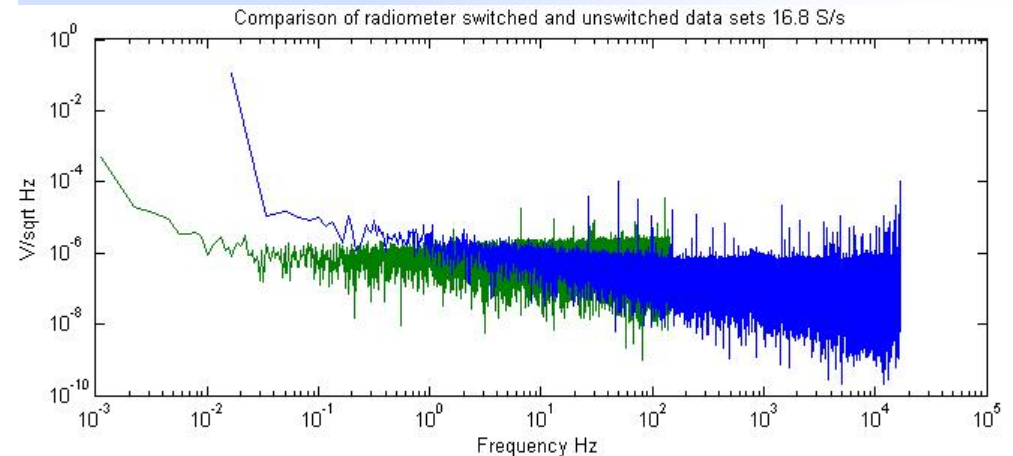
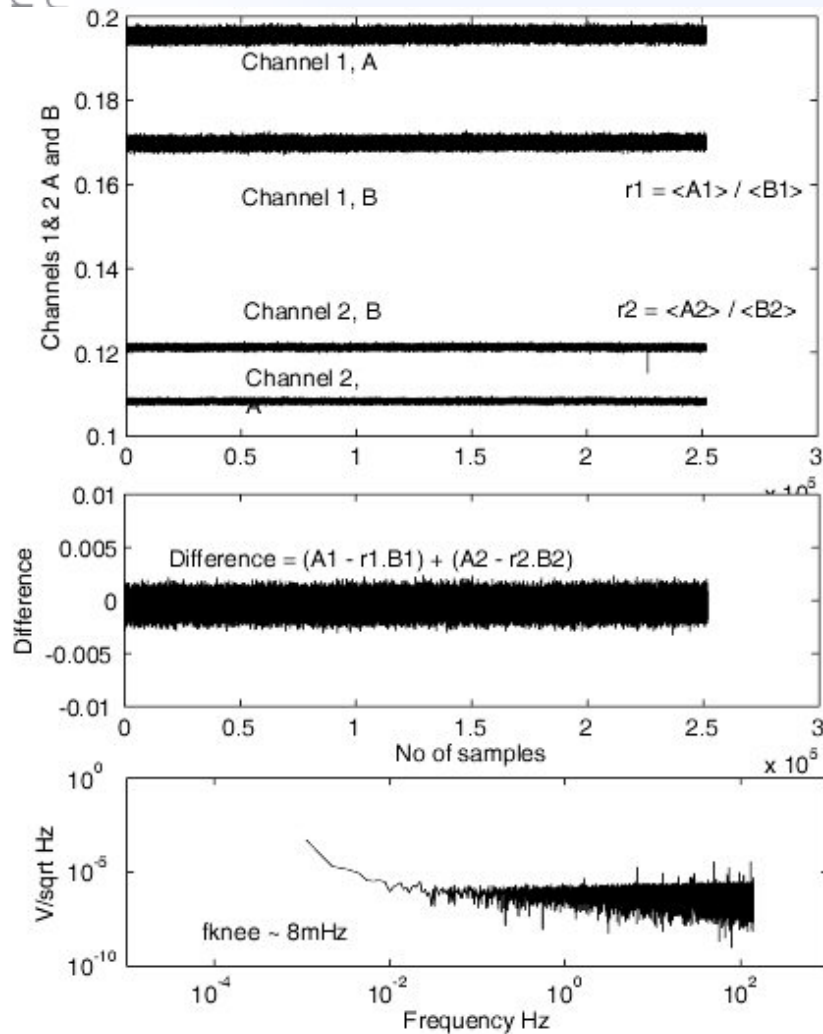
- Cryostat houses 16 feeds
- One window



- 5 FEMs fully characterized and mounted in cryostat
- Performance compared between FEMs



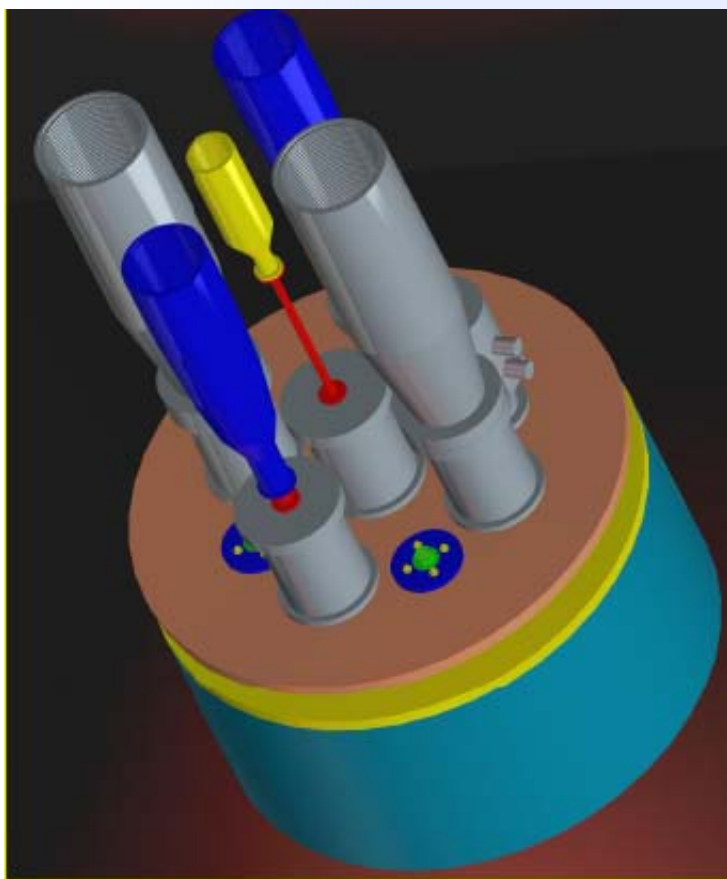
• Measured radiometer data



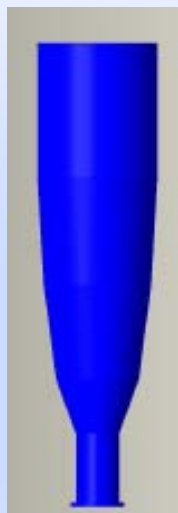
Post OCRA-f: Quijote

- Project partners from Planck and VSA
 - UoM - UK
 - University of Cantabria Santander - Spain
 - IAC – Spain
 - Cambridge - UK

Focal Plane Distribution



26 – 36GHz



14 – 20GHz

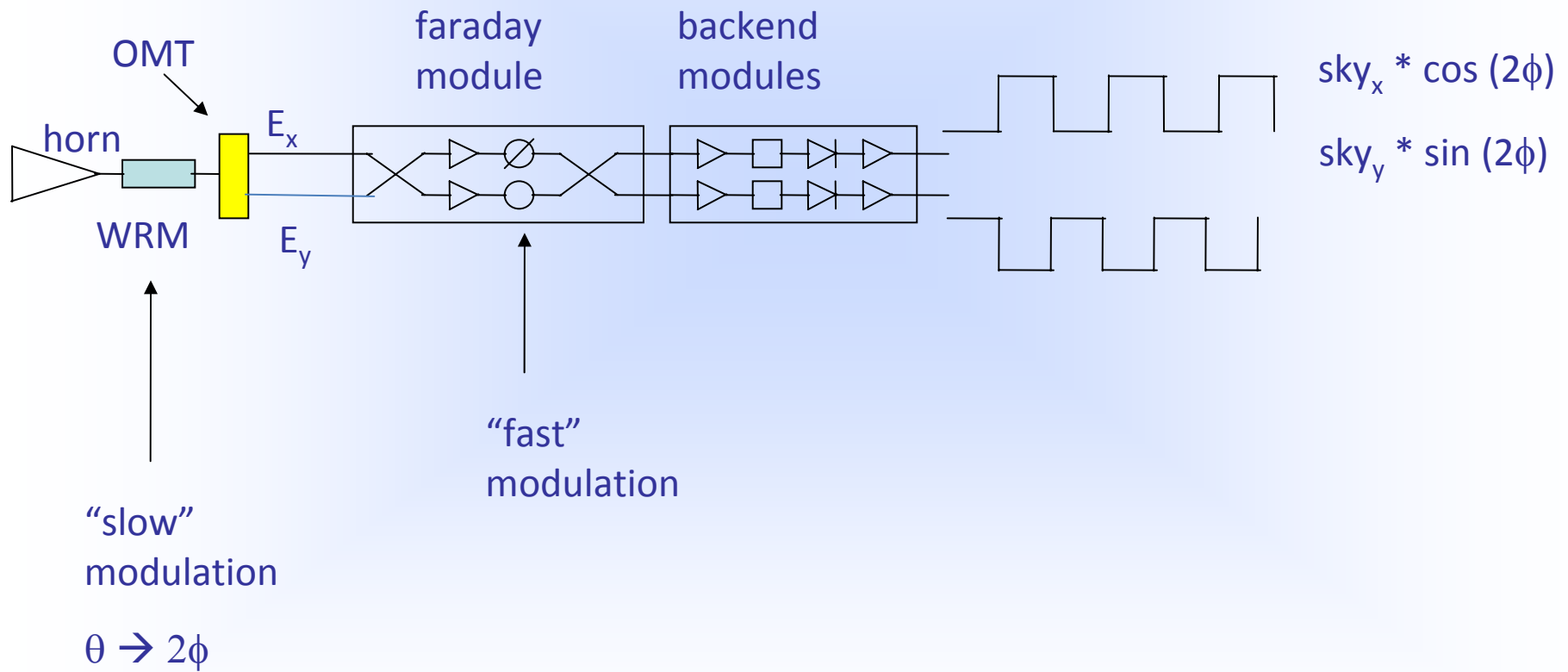


10 – 14GHz

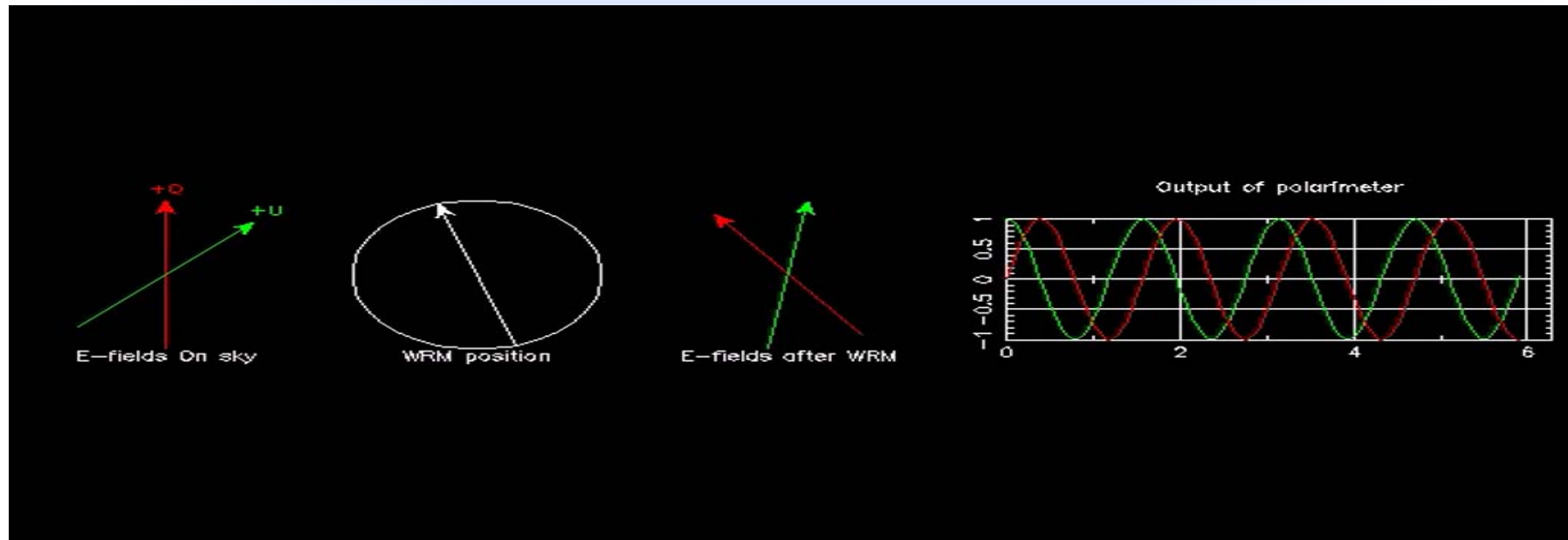
Ka Band array

- Preliminary spec:
 - Bandwidth: 26 to 36 GHz (Effective bandwidth = TBD).
 - System noise temperature: approx. 19 K
 - To achieve a high integrated assembly of FEM + BEM to reduce cost.
 - Modular assembly to allow individual tests of FEM and BEM subsystems.
- Build on existing technology and experiences from OCRA-f

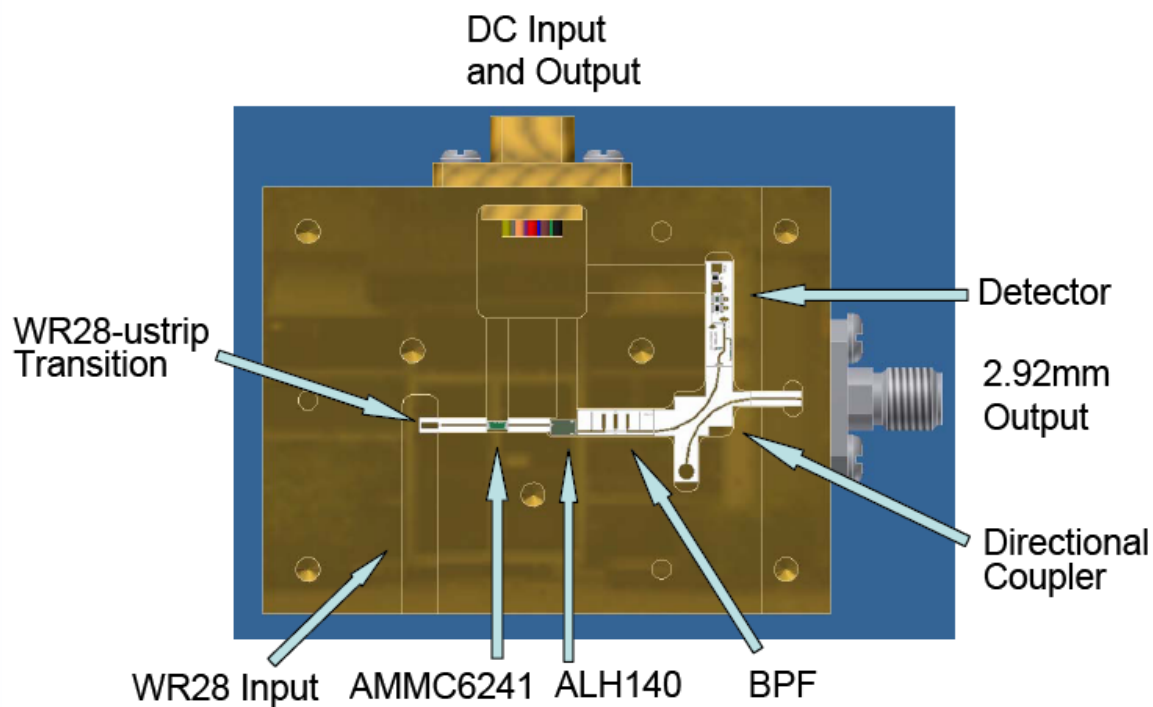
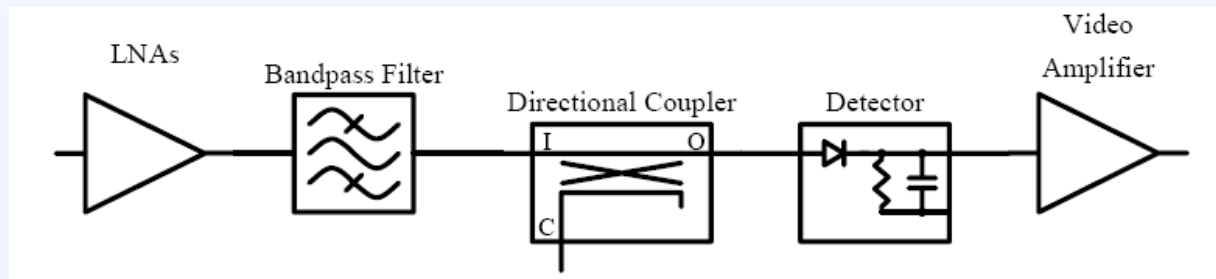
Concept



plot of polarimeter response with wrm angle showing how phase depends on intrinsic polarization on sky



BEM



Directional coupler to allow access to the RF power

Ka-band current status

- Front-end-module assembly
 - MMIC FEM using NGC $L_g=0.1\mu\text{m}$ InP process
 - Assembled at The University of Manchester
- Back-end-module
 - Prototype assembly at University of Cantabria
- Telescope
 - Built in Bilbao integrated in Tenerife
- Cryostat
 - Manufactured in USA

- FEM Tests – UoM (July 08)
- BEM Tests – UoC (July 08)
- Sub-system integration in Manchester (September 08)
- System integration in Tenerife (October 08)