



# Mesh filters polarisation systematic effects studies

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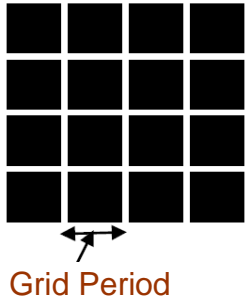
(1) Jodrell Bank Centre of Astrophysics – Manchester University

(2) Astronomy Instrumentation Group – Cardiff University

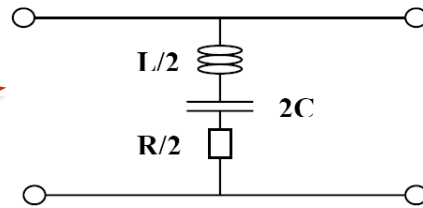
CBMPol Technology Workshop Boulder, 25-28 August 2008

# Metal Mesh Filters Modelling

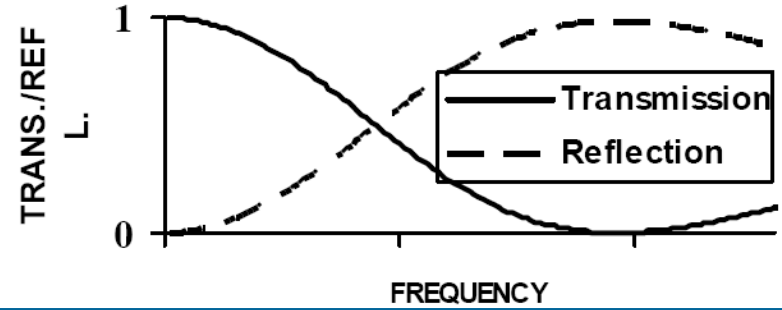
## Capacitive Low-Pass



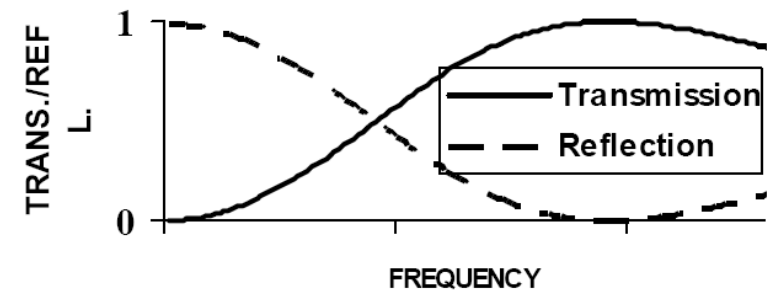
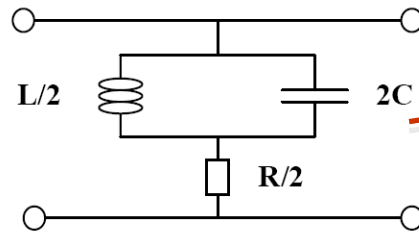
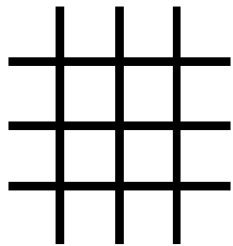
Equivalent Circuit



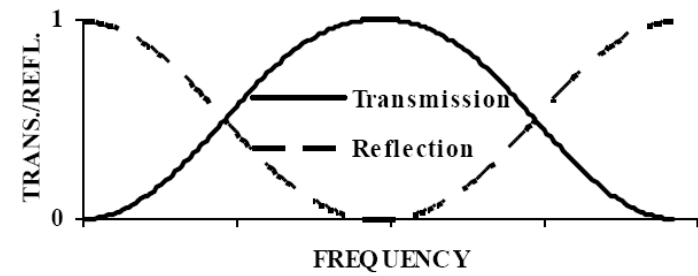
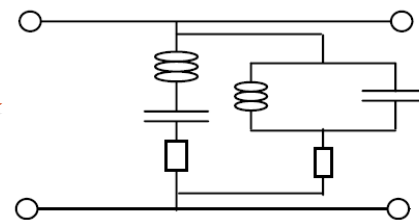
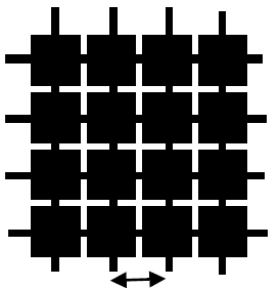
Spectral response



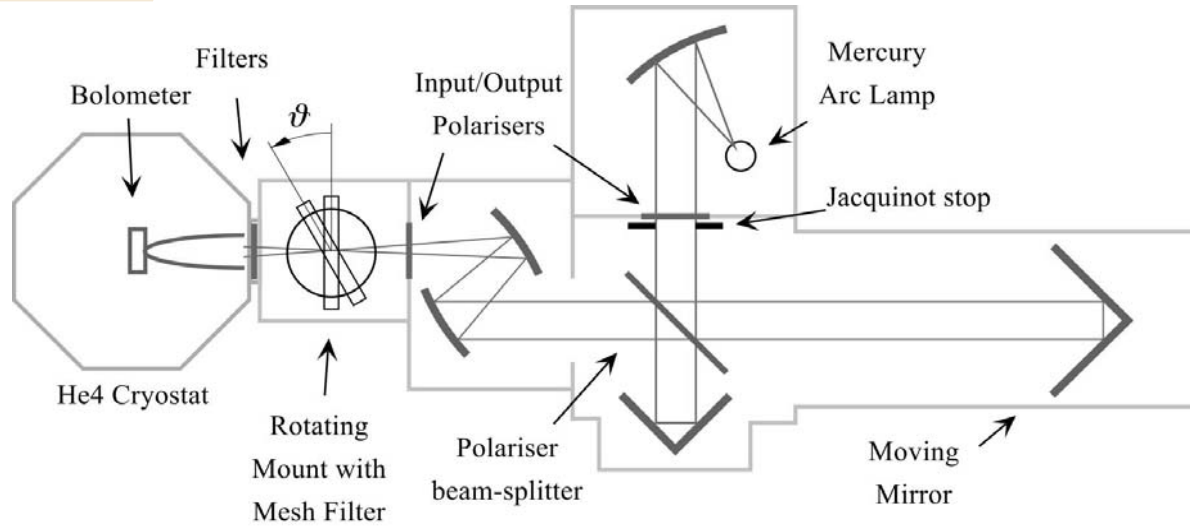
## Inductive High-Pass



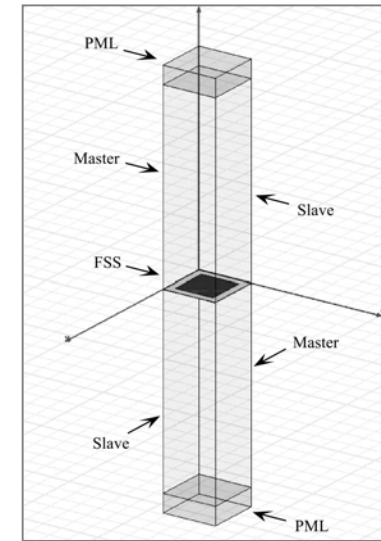
## Resonant Band-Pass



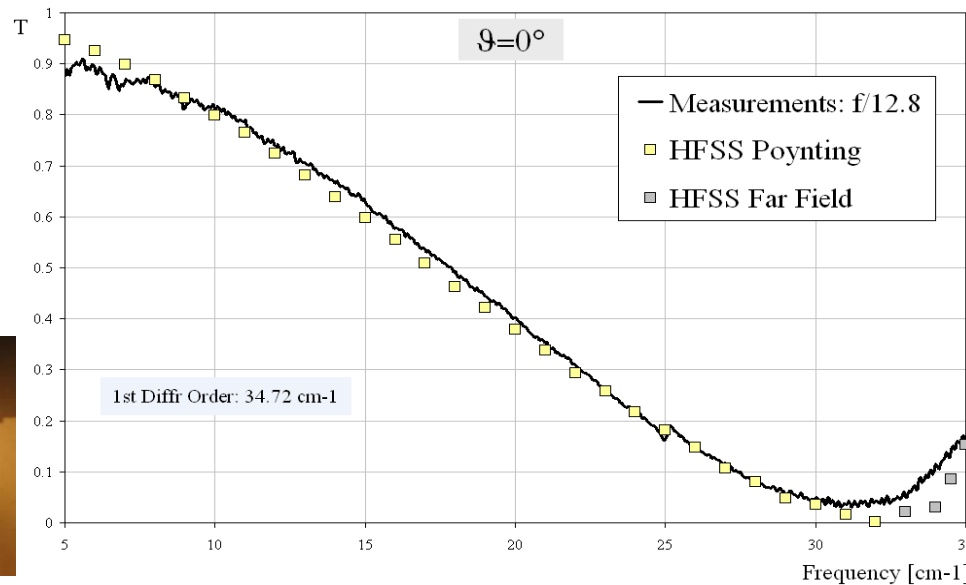
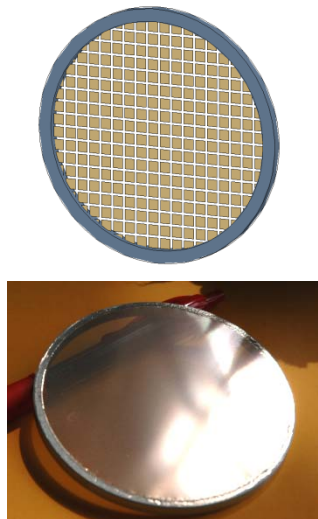
## FTS setup



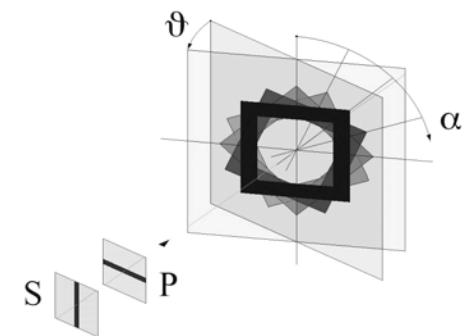
## HFSS model



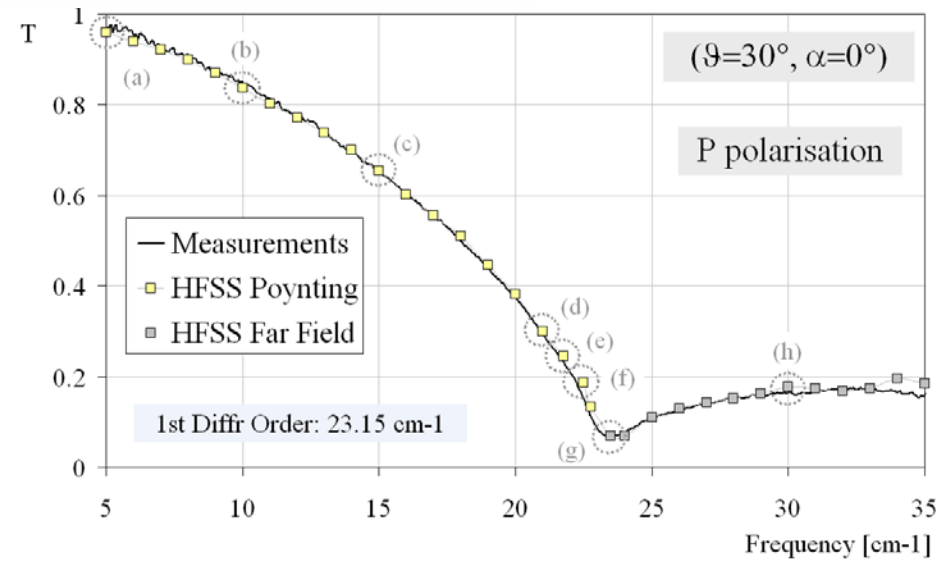
## On-axis results



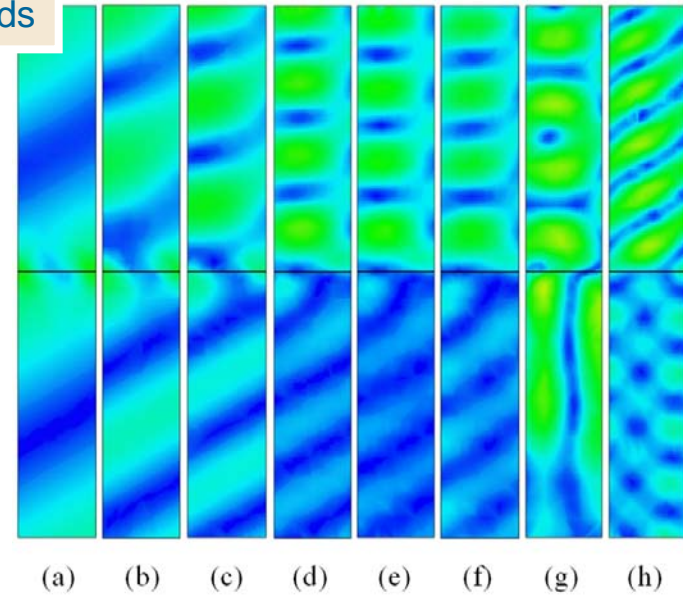
## Off-axis studies



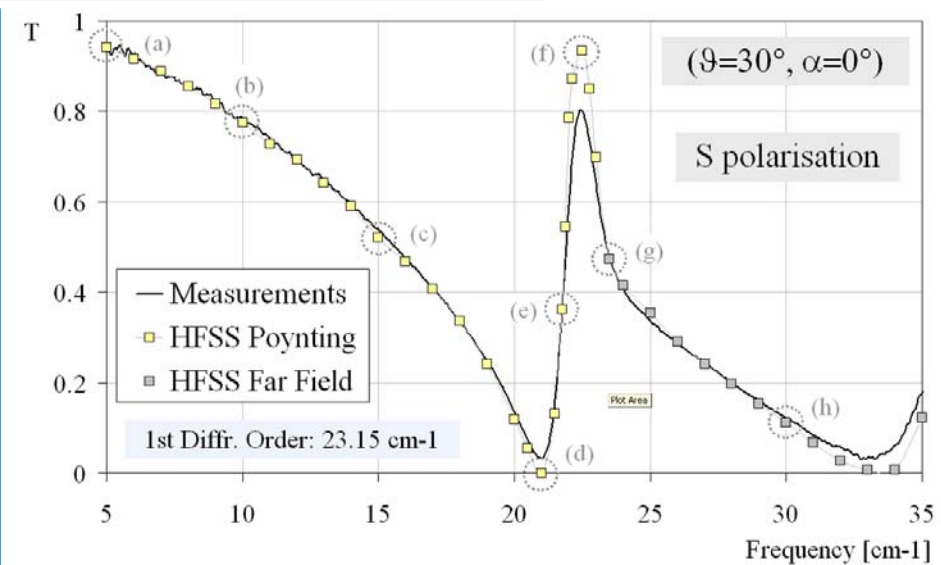
Off-axis "P" polarisation results



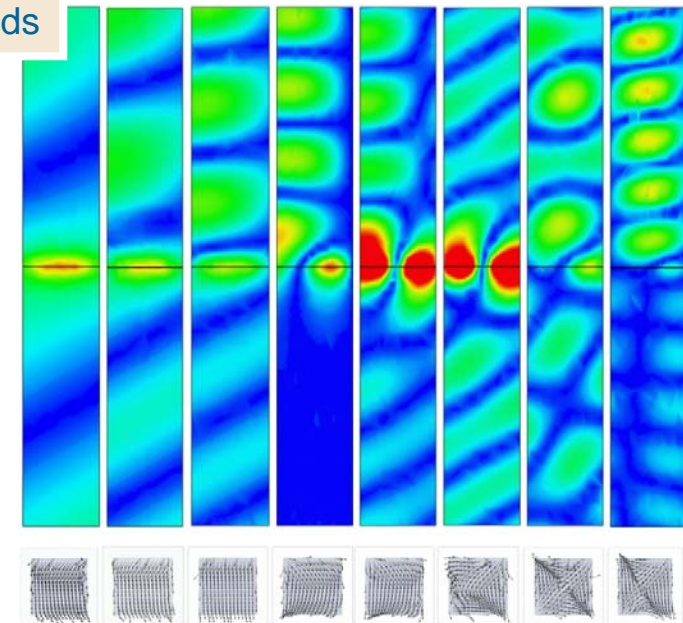
Fields

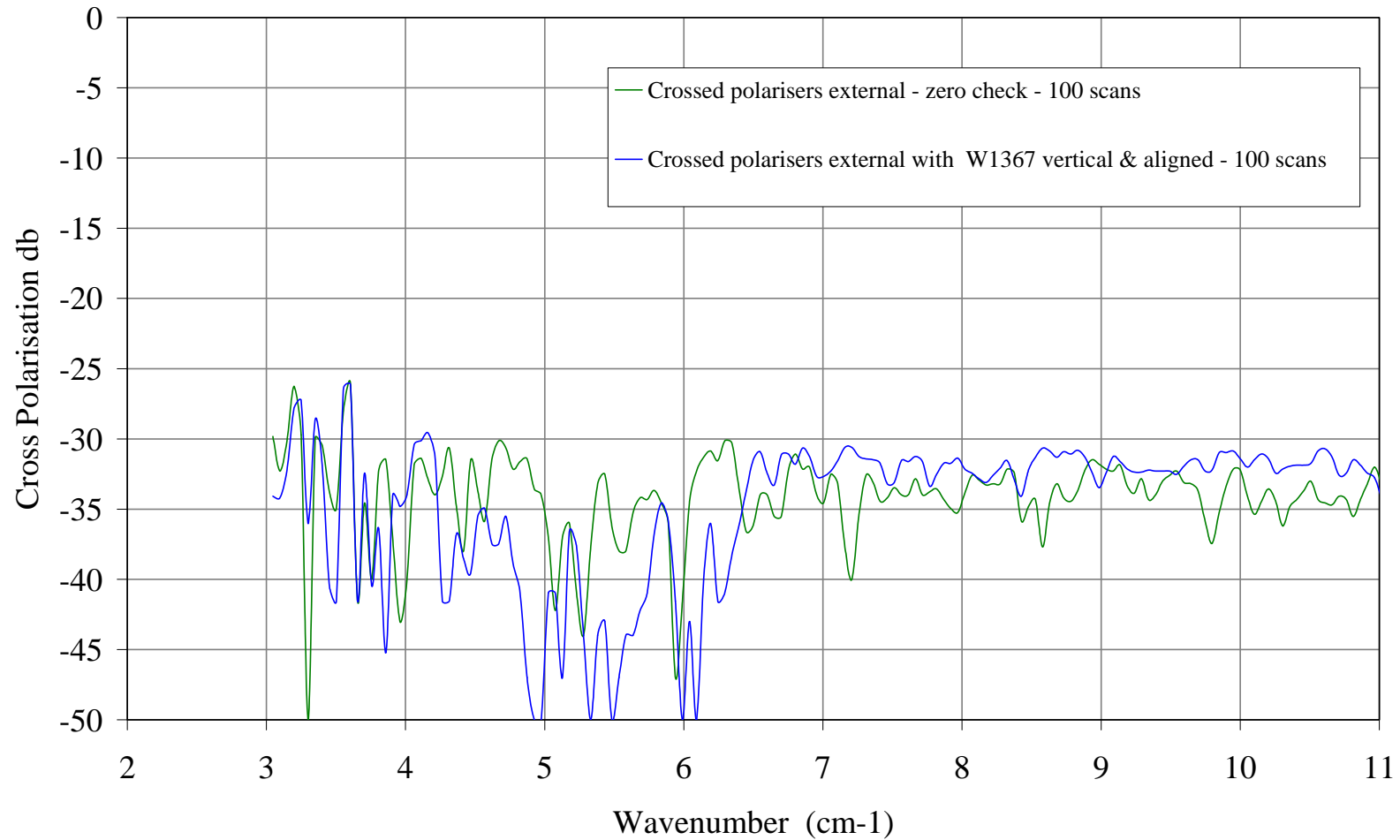


Off-axis "S" polarisation results

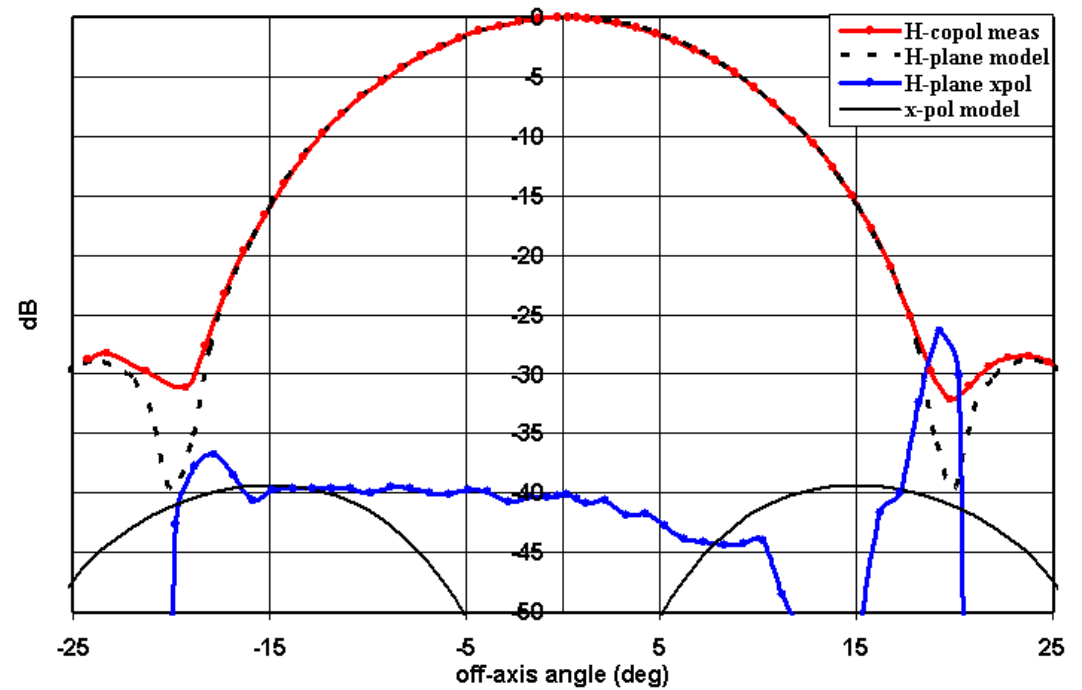
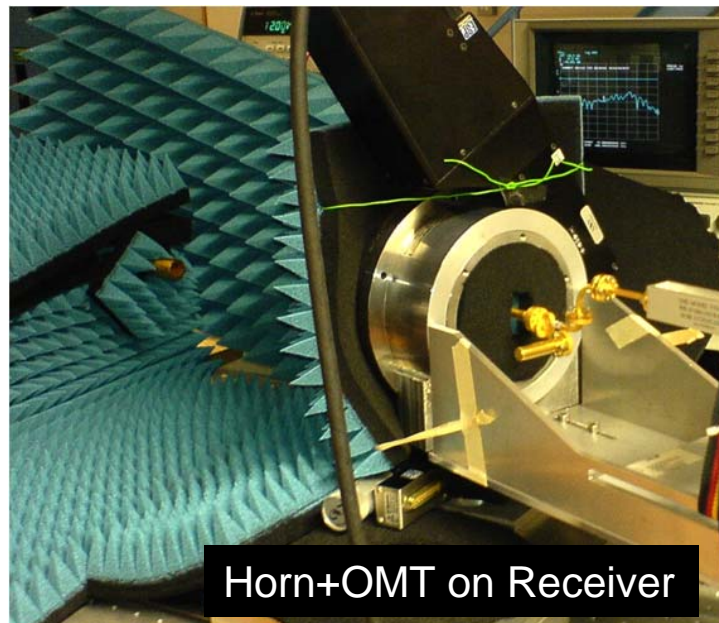
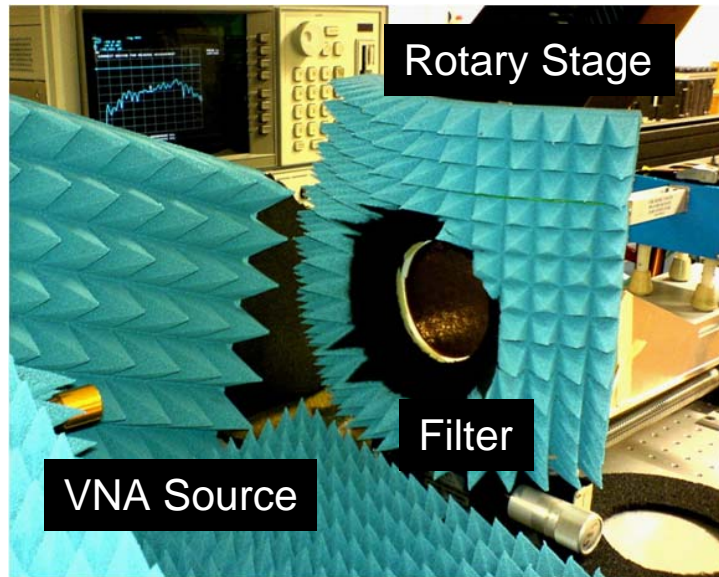


Fields





→ FTS Tests Cross-Polarisation upper limit at less than -30dB level



Co- and Cross-Pol beams at 97GHz

→ Measurement limited by Horn+OMT Cross-Pol ~-40dB

## Filters Co-Polar beam tests (VNA)



- Single filters and stack tested
- Good filters have little impact on the beam

→ If not carefully selected, filters could have a large impact

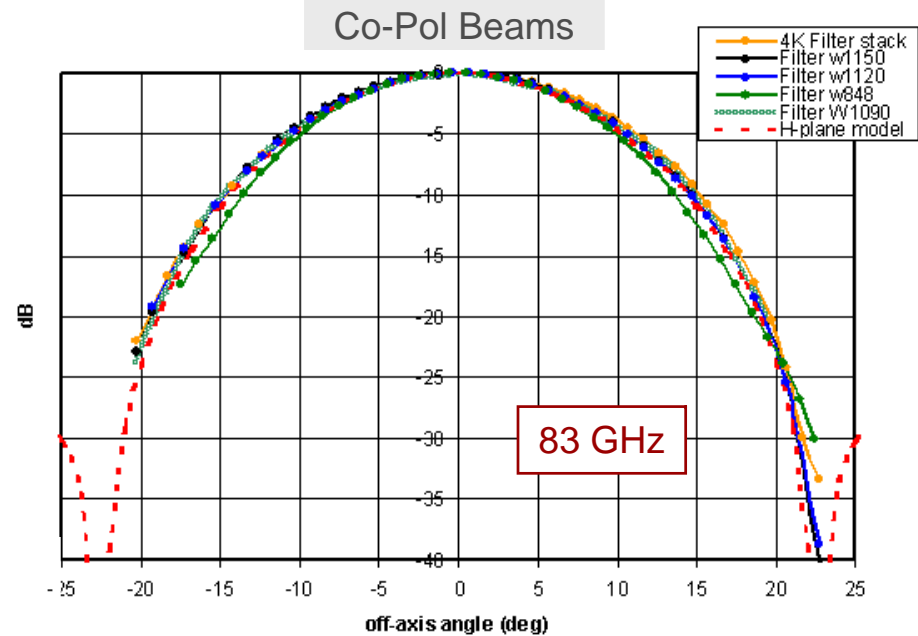
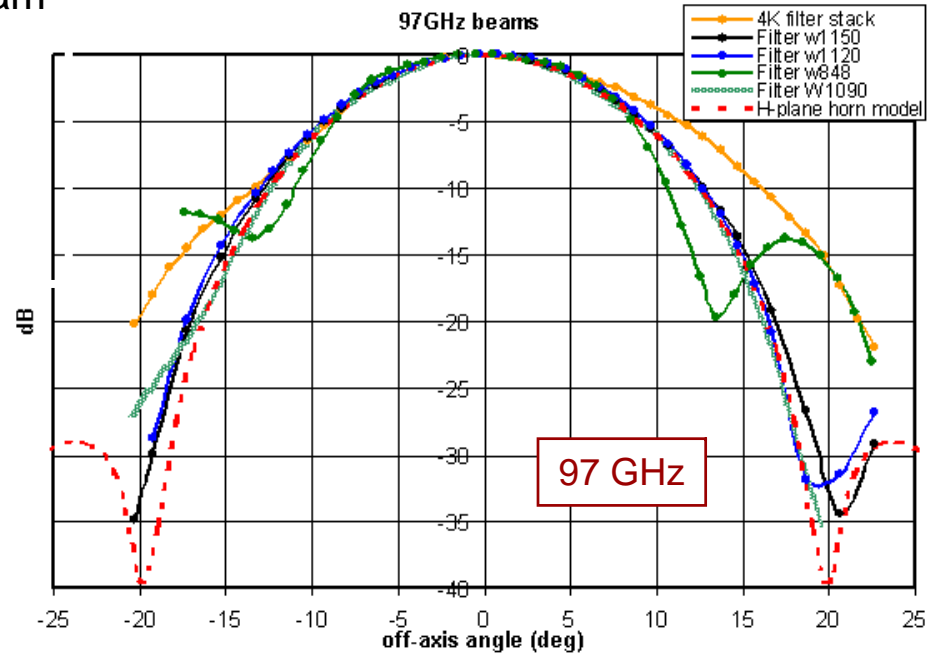
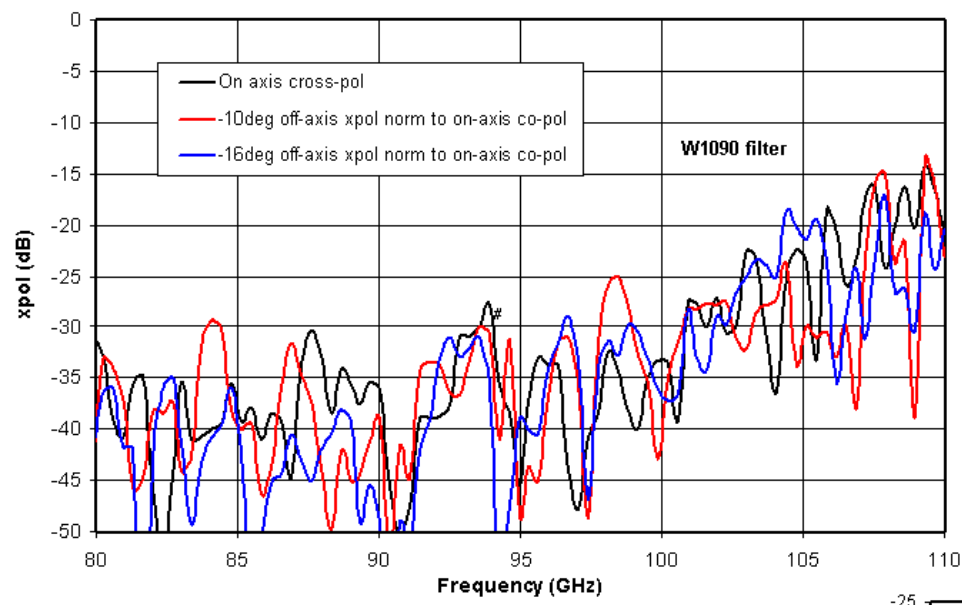


Figure 3: Filters+horn+OMT beams at 83GHz

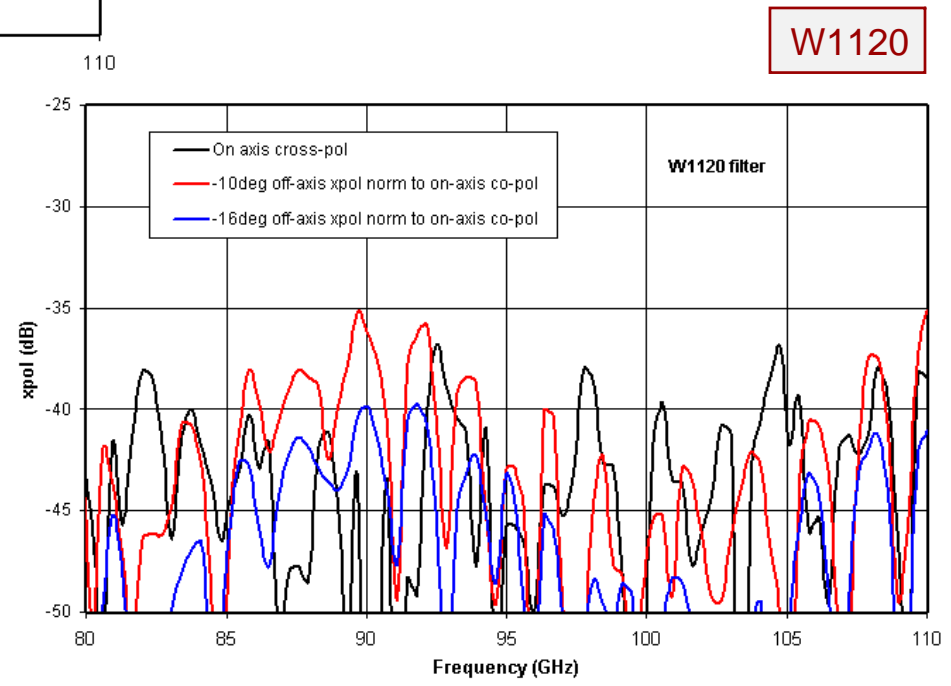


# Filters Cross-Polarisation Measurements at Fixed Incidence Angles

Bruno Maffei et al.  
Proc SPIE v.7020 (2008)



W1090



W1120

→ VNA Tests Cross-Polarisation upper limit at -40dB level



- Preliminary tests on mesh filters show Cross-Polarisations at **-40 dB level**
- Careful **testing of each component** needs to be done in order to select the best filter stacks
- **Study** of the dependence of Cross-Pol with the grids orientations and alignment both theoretically and experimentally needed
- Complete **Cross-Polarisation beams** to be investigated