



**Ollscoil
Mhá Nuad**
Ollscoil na hÉireann
Má Nuad

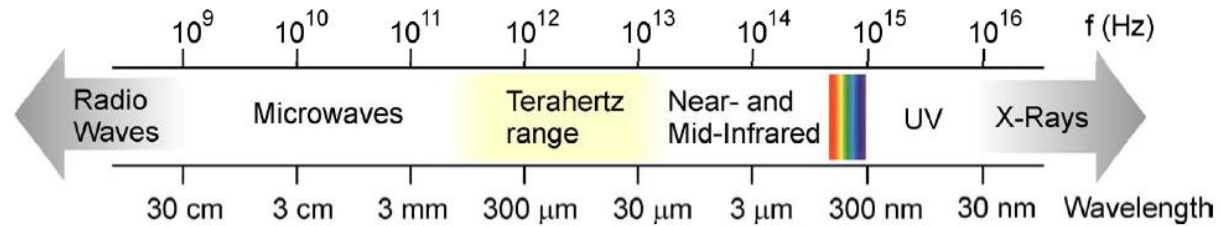
Department of Experimental Physics

National University of Ireland, Maynooth
(Maynooth University)

Terahertz Optics
Créidhe O'Sullivan
Neil Trappe
Marcin Gradziel
Stephen Scully (IT Carlow)

Star Formation & Protostellar Jets
Emma Whelan

Quasi-optics at MU



The group has expertise in millimetre-wave optics, electromagnetics and astronomical instrumentation and observation.

We have a track-record of involvement in CMB experiments over more than 20 years (core members of Herschel, Planck)

and have been part of international consortia awarded ESA TRP and FP7 contracts.

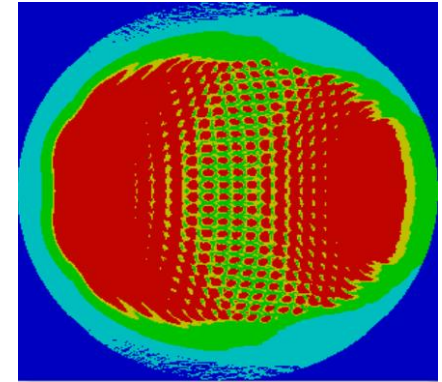
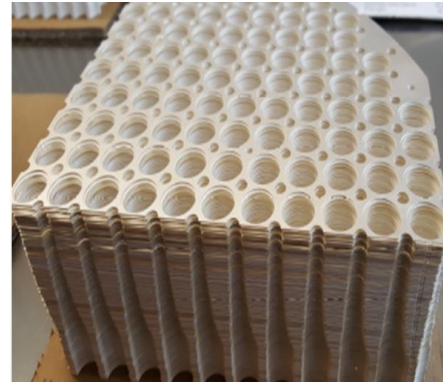
Previous UK Collaborators include

Cardiff University
Cambridge University
Manchester University
UCL
RAL

Astronomical Instrumentation

Modelling: Bolometers, cavities, antennas (especially corrugated horns including multi-moded), quasi-optical beam propagation, coupling, cross-talk, cross-polarisation, scattering, integration with CAD, bandwidth effects, far-field beam patterns

QUBIC

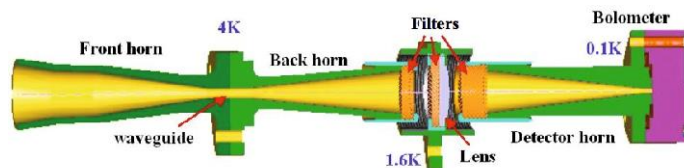
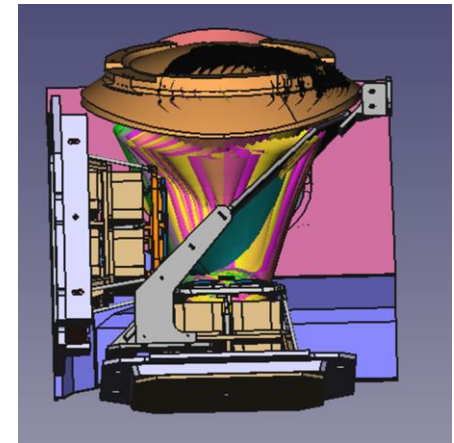
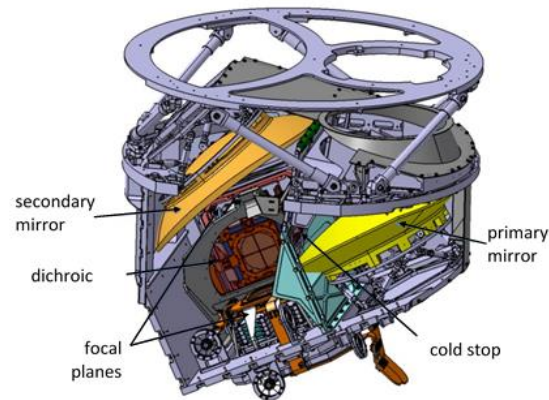


Cosmic Microwave Background

QUaD
Planck (HIFI)
QUBIC



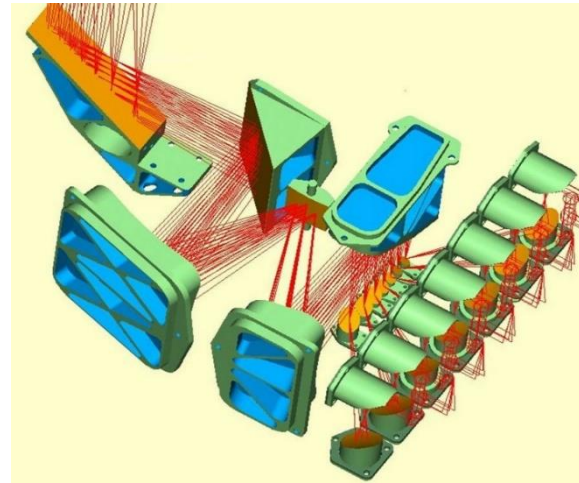
Planck



Astronomical Instrumentation

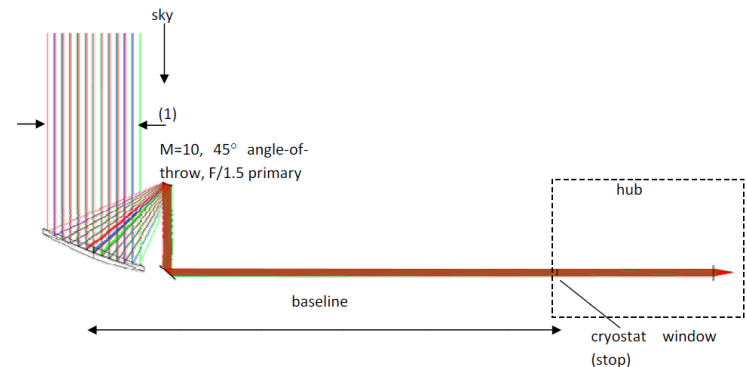
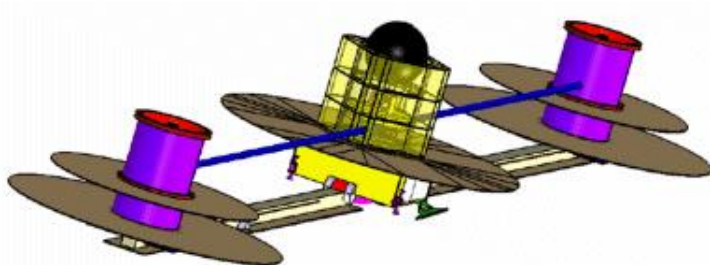
Far-Infrared Telescopes

ALMA (Band 9)
Herschel (HIFI)
SPICA



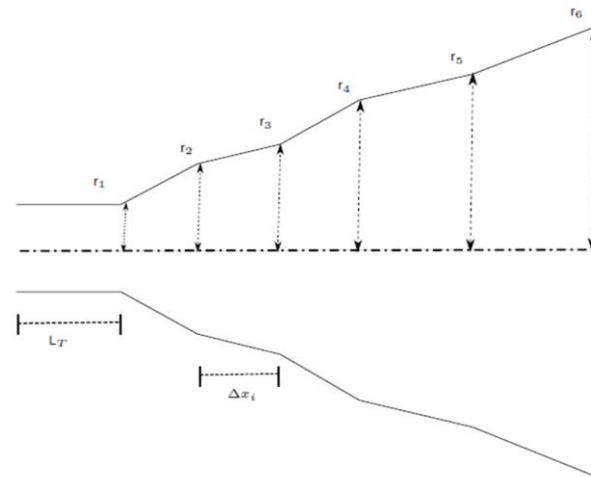
HIFI

FISICA FP7 Far Infra-red Space Interferometer Critical Assessment looked at science goals and preliminary design requirements for the next generation far-infrared space interferometer (FIRI).



Irish Announcement Opportunity (2013-2018) “New Technology High Efficiency Horn Antennas for CMB Experiments and Far Infrared Astronomy” (2 years + 3 years CCN)

- Horn shaping & optimisation
- Multimode horn analysis tools for (absorbing layers(TES)) in waveguide structures
- W band planar antennas
- W Band VNA alignment & calibration techniques

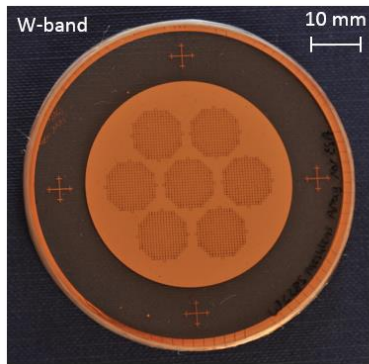


Spline horn design with global optimisation method based on natural selection to develop single-moded beam, low cross polar, return loss $< -30\text{dB}$ & symmetric beam pattern with low sidelobe levels

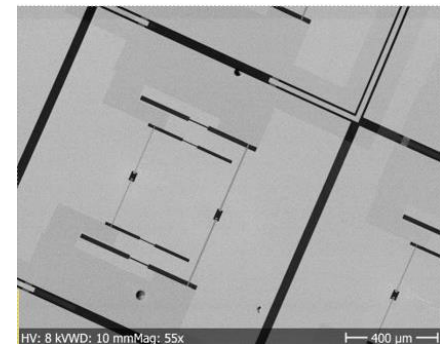
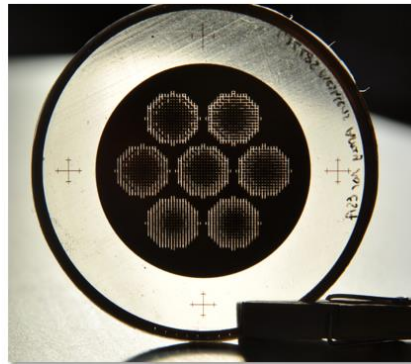
ITT AO/1-7393/12/NL/MH Next Generation Sub-millimetre Wave Focal Plane Array Coupling Concepts (Multichroic focal plane pixels for CMB) (2014-2018)

- Consortium (Maynooth, Cardiff, Manchester, Chalmers, La Sapienza, APC) to develop Multichroic W band planar focal plane pixels
- Planar mesh lens with Cold Electron Bolometer (CEB) detectors prototypes made dual frequency operation at 75 & 105GHz.

Focal Plane Array



7 element flat mesh lens array developed at Cardiff

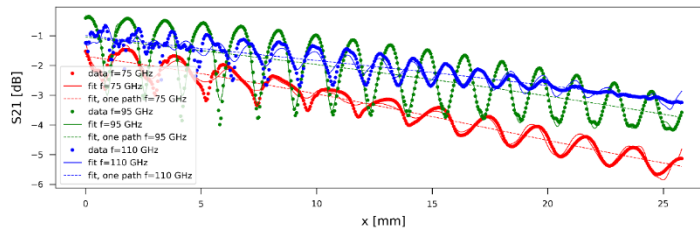
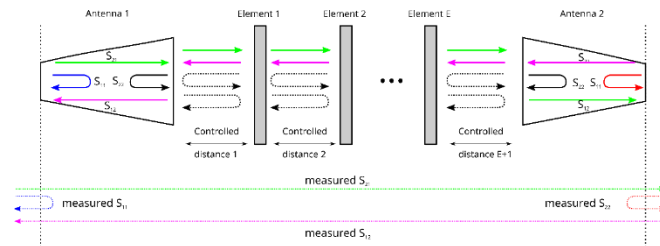


Dual polarization, 75 & 105 GHz slot antenna array with CEB developed at Chalmers

Laboratory Measurements

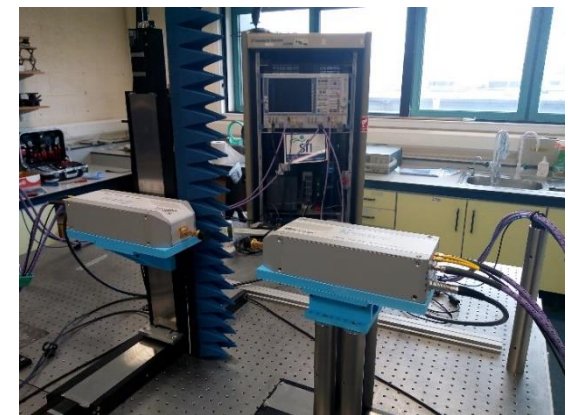
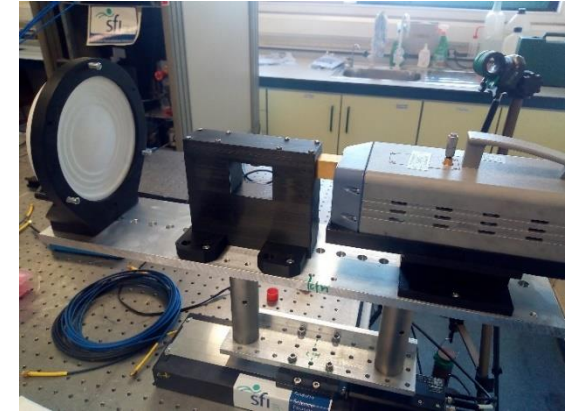
VNA (Vector Network Analyser) based near field scanning facility to characterise waveguide components and antennas in the W-band (75 to 110 GHz).

Rohde & Schwarz ZVA-24 RF VNA and twin ZVA-110 frequency converter.



A THz measurement facility is in the final stages of development through infrastructure funding from SFI (SFI16/RI/3702).

500 GHz – 1.1 THz.



High Angular Resolution Spectroscopy @ Maynooth

Interests

- Protostellar Jet Launching
- Brown Dwarf Jets
- Planet Formation in Transitional Disks

Techniques

- AO assisted IFS
- SAM
- Spectro-astrometry

Instruments

- KECK/OSIRIS
- VLT/UVES/XSHOOTER/MUSE
- VLT/SPHERE

