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# THz Frequency Selective Surface Filters for Earth Observation Remote Sensing Instruments

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| **Locations** | Gisbert Kapp Building, N123 |
| **Date(s)** | Thursday 7th March 2013 (14:00-16:00) |
| **Download** | **Add to Calendar (/schools/eece/news/remote-sensing-seminar.aspx?ical=true)** |

The next EECE Research Seminar will take place on Thursday 7th March at 2pm in room N123. A light Lunch will be served from 1.15pm for those attending the seminar.

Dr Robert Cahill, Reader at Queens University Belfast will be talking about **THz Frequency Selective Surface Filters for Earth Observation Remote Sensing Instruments**

## Abstract

In the past decade Earth observation instrument technology has largely been driven by the need to provide spectroscopic characterisation of the Earth's atmosphere for studies which will provide new insights into phenomena including atmospheric composition, ozone depletion and climate change. What these missions have in common is that they require state-of-the-art hardware to achieve the high receiver sensitivity necessary to detect weak molecular emissions at mm and sub mm wavelengths. To satisfy satellite payload constraints on cost, mass and energy consumption, passive remote sensing radiometers traditionally employ a single mechanically scanned aperture antenna to collect radiation over a wide frequency range. The signals are spatially and spectrally separated within the heterodyne receiver by Frequency Selective Surfaces (FSS). The key technology challenge is to ensure that the devices simultaneously exhibit very low signal band insertion loss and meet the conflicting requirement for high isolation between adjacent frequency bands. The purpose of this talk is to present an overview of a multidisciplinary research project at Queen's University Belfast which has exploited state of the art developments in silicon micromachining technology to create a new class of substrateless FSS which exhibit enhanced performance and functionality. This type of structure has very high mechanical strength and rigidly properties which satisfy the requirements for space deployment. Finally the results of recent work to create electronically tunable mm wave FSS and reflectarray structures based on Liquid Crystals will also be presented.

## Biography

Robert Cahill received a BSc (1st class) honours degree in Physics from the University of Aston in 1979 and a PhD degree in microwave electronics from the University of Kent at Canterbury in 1982. He joined Queen's University Belfast (QUB) in 1999 after a 17 year career working in the UK space and defence industry, where he worked on antenna and passive microwave device technology projects. During this time he has pioneered methods for predicting the performance of antennas on complex scattering surfaces such as satellites and has developed techniques for analysing and fabricating mm and sub-mm wave quasi-optical dichroic filters. He has exploited the results of numerous research projects, sponsored by European Space Agency, Astrium Space, The UK Space Agency and the UK Meteorological Office, to develop FSS devices for atmospheric sounding radiometers in the range 89 - 600 GHz. These include AMSU-B, AMAS, MARSCHALS, ESA 500GHz demonstrator and the Microwave Sounder Instrument for the METOP SG mission. Dr Cahill's recent interests also include the characterisation of liquid crystal materials at microwave and mm wavelengths, and strategies for broad banding and creating active reflectarray antennas. He has (co) - authored over 150 publications and holds 5 international patents.

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