UCMMT 2014 - 7th Europe/UK-China Millimetre Waves and Terahertz Technology Workshop

Event Summary Report

The 7th Europe/UK-China Millimeter Waves and Terahertz Technology Workshop was held in Chengdu, China on 2-4 September 2014. The event provided a unique forum where leading scientists from China, Europe and United Kingdom shared their knowledge in the field of Millimeter Waves and THz sources, devices, systems and applications. The event's agenda provided scientific guidance, technical insights and real life case studies through a balanced mixture of strategic talks and technical breakout sessions to over 150 delegates.

Keynote Session

Stating the importance of closer collaboration for the progress of Millimeter Waves and Terahertz Technology, 4 keynote talks from Chinese Academy of Science, University of Cardiff-UK, UESTC - China and European Space Agency provided a great start of the event. The key note talks kicked the day off, with discussion on the overarching themes of the Terahertz programme, and brought up the first mention of Terahertz Real Time 3D Imaging; MM-Wave Observations of Ice clouds; New Slow Wave Circuits; and MM and SMM Radiotelescopes, Terrestrial and Space Considerations. The Key note speakers delivered an excellent breakdown of the challenges, uncertainties and also of the opportunities, while highlighting the breadth and depth of activity within and outside their organisations in these areas. The Keynote discussions set the scene for the thematic technical sessions that followed in the afternoon of Day one and Day two.

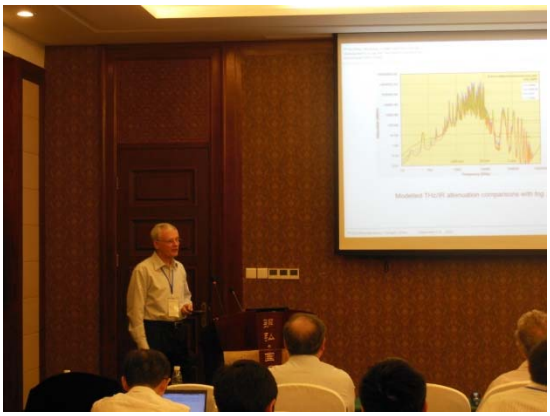
Themed Technical Sessions

The event format included numerous parallel technical sessions. These sessions delivered unique perspectives on technology evolutions within the challenging landscape, as well as innovative frameworks that can be adopted to manage existing and emerging challenges. 114 technical papers were presented which included 77 from China and 37 papers form UK. 12 out of the 37 papers presented by UK researchers were joint papers. UK partners included Queen Mary University of London, Cardiff University, STFC Rutherford Appleton Laboratory, Thomas Keating Ltd, TeraTech Ltd, UCL, Oxford University, Lancaster University, Strathclyde University and Liverpool University. Chinese partners included Beijing University of Posts and Telecommunications, the University of Electronic Science and Technology (UESTC), the Beijing Institute of Technology, Beihang University, the National Space Science Centre of Chinese Academy of Science, Southeast University, the Electronic Research Institute of Chinese Academy of Science and Tongji University. The 2014 technical themes included: Vacuum Devices, Solid-state Devices and Systems; THz Antenna; and THz Applications.

Delegates heard from experts how recent technology developments relating to the Terahertz technology, business and regulatory landscape will impact organisations and gained invaluable insights that can help inform research plans for the year(s) ahead. The depth of the speakers' knowledge and the variety of research issues (e.g Challenges for Digital MBAs and Fast wave Devices, opportunities for Schottky based mixers for future deep space missions, state of the art in THz antennas, rectennas and THz imaging) addressed within each theme, kept energy levels and discussions high throughout the workshop.

Young researchers had ample opportunities to learn about new technological innovations, ‘make or break’ factors that determine the success or failure of projects. The selection of UK, China and EU universities and other organisations at the event was excellent with many of them being able to raise relevant questions or offer suitable technical advice to early career researchers which meant it was an efficient way to understand what it possible and who could help make it happen.

A special issue of the International Journal of Terahertz Science and Technology will be dedicated to extended versions of papers from UCMMT' 2014. Shenggang Liu Science and Technology Development Foundation kindly supports the Best Student Paper Awards.

Panel Session

In the final session of the Chengdu workshop, QMUL facilitated panel discussions in the THz landscape. The two day technical deliberations had been full and thought-provoking with university, policy and industry perspectives. The panel was comprised of 8 panellists from Oxford, RAL, Cardiff, and UCL from the UK , and CETC, UESTC, CAS and Southeast from China. Reflecting on the challenges and uncertainties surrounding THz, the panellists were invited to share their experiences and thoughts on how these challenges could be addressed. The panel discussions elicited the highest number of audience questions and it was clear that there are a number of challenges that need addressing. The session was concluded by Prof GhassanYassin from Oxford, outlining key challenges relating to sources, devices, systems and applications and possible collaborative opportunities for the future which chimed well with the issues in all presentations of the workshop. There was a strong feeling that UK-China collaboration should be well positioned to address these challenges and focus on developing smaller networks and partnerships was supported.

CETC Session

The CHINA ELECTRONICS TECHNOLOGY GROUP CORPORATION (CETC) is the co-host of the workshop and organised a special CECT Session. One invited talk was given by Prof Feng Jinjun of CETC12 on the overview of CETC and their THz research work. CETC consists of 48 Research Institutes and 184 companies (7 listed on the stock exchange markets) with 110,000 employees. There are over 10 research institutes of CETC engaged in the field of terahertz technology which includes theories, components, devices, instruments, systems and application etc. Another invited talk was given by Dr Hao Tu of CETC38 on the THz Imaging system for Security Application, covering the state of the art of the technology, technical challenges, the prototypes developed at CETC38 and market demands. CETC has identified the THz technology as one of high priority areas to be developed in the near future and sought actively for collaborations with UK/Europe. They are in the process of signing a collaboration agreement on THz technology development with RAL Space.

Poster Session

There are also two Poster Sessions in the Exhibition Hall on 2nd and 3rd of September, respectively. There are about 66 posters were presented. A large number of delegates visited the exhibition and interacted with the 6 exhibitors.

Space THz Technology Networking Meeting in Beijing

Around 50 delegates in Beijing were welcomed by Prof Guangyou Fang of Electronic Institute of Chinese Academy of Science on the 5th of September. Mr Hu Daobing of Chinese Space Agency was invited to give a welcome speech as well Karen Maddocks from British Embassy Beijing provided a valuable introduction to the broad variety of areas the Science and Innovation Network supports and stressed that the Network could serve as an efficient and innovative platform to promote the UK-China scientific cooperation in Space THz.

The launch of Newton Fund, with aims to develop science and innovation partnerships was considered as a timely opportunity to develop innovative solutions in the field of THz. The fund provides for capacity building, research fellowships, joint centres, research collaborations, innovation partnerships and challenges. Karen outlined the new landscape for UK-China collaboration in Newton fund and the challenges and opportunities therein, leaving a positive note for future work together. Resources to look into for support in creating a network with China include: Mailing list of the CBBC (www.cbbc.org); British Council Scholarships, British Embassy Projects and the UK government's global scholarship programme - Chevening studentships.

Institutional commitment to support these activities and interest to collaborate with UK partners was echoed by Prof Guangyou Fang (Institute of Electronics, CAS). Major research fields and interest providing opportunities to collaborate were highlighted as: Microwave imaging technology (SAR), Vacuum tubes, Ground penetrating radar, Geophysical exploration technology (1Hz) and THz imaging (300 GHz). Prof. Xiaolong Dong from NSSC discussed the Chinese Space Programme and the Laboratory of Microwave Remote Sensing (MiRS). The R&D focus at NSSC was stated as payload technology for earth observation and space exploration; Radio, MW, MMW SubMMMW/THz; Radiometer, scatterometer, altimeter (except SAR); Calibration & validation; and Retrieval and processing. Potential collaborations were presented as high performance devices, large space based antennas and Calibration of THz sensors.

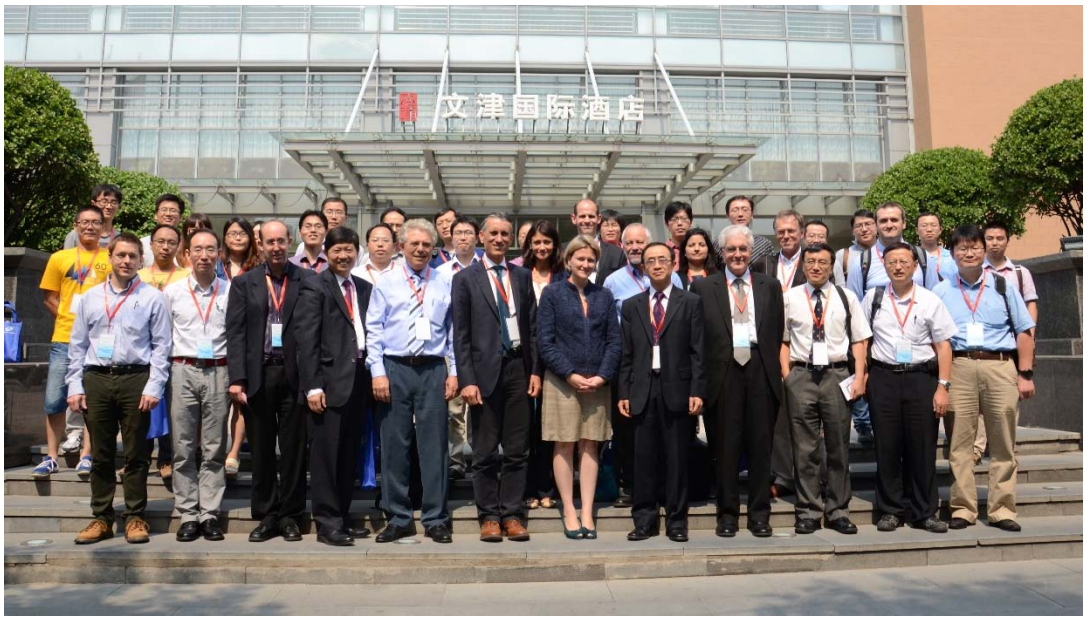
Further institutional interests and commitments were presented by 20 Chinese and UK universities and Research Institutions. Challenging technologies in THz imaging were noted as facial plane detection, quasi-optical transmission, and system calibration, imaging compensation and fast scanning. Challenging technologies in THz communications were recognised as High gain/power antenna, High speed modulation/demodulation, High sensitivity THz detectors, High speed signal processing and THz wave fast tracking and aiming.

Panel Discussions

The Panel session in Beijing covered many of the most topical issues faced by the THz community. This high profile networking session which brought together representatives from universities and government across China, UK, and EU addressed the complexities and challenges of engaging with China, UK and EU funding. There was considerable interest from delegates about the upcoming funding opportunities which fuelled discussions around how to adapt to new funding circumstances (Newton fund, Horizon 2020) and embrace innovation and development activities. The session proved to be mutually beneficial where the participants learnt from one another the opportunities offered, the facilities available and discussed how these can be consolidated and utilised to tackle the challenges together. The session facilitated knowledge exchange, provided networking opportunities and opportunities to share ideas, opinions and best practices to facilitate China-UK collaborations. Some of the general challenges for Space applications were recognised as: High

efficiency devices; High reliability; Long lifetime; Light weight; Small size; and Mechanical and Cosmetic environment. Some of the facilities that were mentioned include: Electronic Engineering Microwave Antenna Institute -Tsinghua University; International Research Joint Lab on Electromagnetic Theory and Applications -BUPT and QMUL; Beijing Key State Lab of THz, Spectral and Imaging -Capital Normal University; Optical Science Laboratory (Visible and Far-IR/THz-University College London), Design and Measurement facilities at Strathclyde to name a few and plans to establish China-UK Science and Technology JOINT collaboration centre. Emerging themes that were discussed and moderated by the panel of experts included Earth observing; Security Imaging; Astronomy; and Emerging Applications.

The 7th Europe/UK-China Millimeter Waves and Terahertz Technology Workshop in Chengdu and networking meeting in Beijing boasted a particularly strong collection of speakers and stimulating discussions in plenary, parallel, panel and networking sessions. The event was carefully designed to provide ample networking time affording the Terahertz community an opportunity to discuss innovative developments in an intellectual environment deepening their subject knowledge and catching up with new and existing peers. The delegates made a number of contacts during the event and are following up on a number of leads which are expected to lead to some interesting research and business collaborations in the near future.



Partnering Summary

UK Organisation	Intention of Collaboration with Chinese Organisation
THz Ltd	▪ National Space Science Center, Chinese Academy of Sciences
UK Space Agency/Cardiff University	▪ Chinese Space Agency ▪ Beijing Institute of Technology ▪ Capital Normal University ▪ National Space Science Center, Chinese Academy of Sciences ▪ Shanghai Academy of Spaceflight Technology
Queen Mary University of London	▪ Beijing University of Posts and Telecommunications ▪ Institute of Electronics, Chinese Academy of Sciences ▪ The 12th institute, China Electronics Technology Group Corporation ▪ Beijing University of Aeronautics and Astronautics ▪ Tsinghua University, China ▪ Shanghai Academy of Spaceflight Technology ▪ University of Electronic Science and Technology of China
University of Liverpool	▪ Chinese Space Agency ▪ Beijing University of Posts and Telecommunications ▪ Institute of Electronics, Chinese Academy of Sciences ▪ Beijing Institute of Technology ▪ Tsinghua University, China
University of Strathclyde	▪ Beijing University of Posts and Telecommunications ▪ China National Space Science Center, Chinese Academy of Sciences ▪ The 12th institute, China Electronics Technology Group Corporation ▪ Beijing Institute of Technology ▪ Tsinghua University, China ▪ University of Electronic Science and Technology of China
University of Lancaster	▪ Institute of Electronics, Chinese Academy of Sciences ▪ The 12th institute, China Electronics Technology Group Corporation ▪ Beijing Institute of Technology ▪ Capital Normal University
University College London	▪ Chinese Space Agency ▪ China National Space Science Center, Chinese Academy of Sciences ▪ The 12th institute, China Electronics Technology Group Corporation ▪ Tsinghua University, China ▪ Capital Normal University ▪ University of Electronic Science and Technology of China ▪ Shanghai Academy of Spaceflight Technology
University of Oxford	▪ Institute of Electronics, Chinese Academy of Sciences ▪ Beijing University of Aeronautics and Astronautics ▪ National Space Science Center, Chinese Academy of Sciences ▪ The 12th institute, China Electronics Technology Group Corporation
Rutherford Appleton Laboratory	▪ National Space Science Center, Chinese Academy of Sciences ▪ University of Electronic Science and Technology of China