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## Welcome

Purple Mountain Observatory and Key Lab of Radio astronomy, Chinese Academy of Sciences, welcome you to the 27th International Symposium on Space Terahertz Technology (ISSTT2016), held from April 12 to 15, 2016, in Nanjing, China.

A total of 106 abstracts were accepted, with 49 abstracts scheduled for oral presentation and 57 for poster presentation. There are 3 invited contributions. We would like to thank the Scientific Organizing Committee for the abstract review.

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### *Local Organizing Committee*

Sheng-Cai Shi, Rui-Qing Mao, Jing Li, Wen Zhang, Wei Miao, Xue-Mei Chen

# The 27th International Symposium on Space Terahertz Technology

April 12-15, 2016, Nanjing, China

## Program

### Tuesday, April 12, 2016

14:00-20:30 Registration

18:30-20:30 Reception

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### Wednesday, April 13, 2016

8:00-8:30 Registration

8:30-8:40 Welcome & Opening Remarks

### 8:40-10:10 W1 Session: THz Projects & Instruments (I)

(Chair: Heinz-Wilhelm Hübers)

8:40 ALMA - Scientific Results and Future Developments (Invited)  
Tetsuo Hasegawa (*National Astronomical Observatory of Japan*)

9:10 The Far-Infrared Spectroscopic Explorer (FIRSPEX): Probing the Life-  
Cycle of the Interstellar Medium in the Universe  
Ghassan Yassin (*University of Oxford*)

9:30 CMB Polarization Experiment "GroundBIRD"  
Chiko Otani (*RIKEN Center for Advanced Photonics*)

9:50 First Flight of the PILOT Balloon Borne Experiment  
Francois Pajot (*Institut de Recherche en Astrophysique et Planetologie*)

10:10-10:40 Coffee Break

10:40-12:20 W2 Session: THz Mixers& Detectors (I)

(Chair: Jonathan Kawamura)

10:40 ( 3 ) HEB Waveguide Mixers for the upGREAT4.7 THz Heterodyne Receiver Array  
Patrick Püetz (*University of Cologne*)

11:00 ( 3 ) Study of IF bandwidth of NbN Hot Electron Bolometers on GaN Buffer Layer using a Direct Measurement Method  
Sascha Krause (*Chalmers University of Technology*)

11:20 THz Sensors Based on Superconducting MgB2  
Boris Karasik (*Jet Propulsion Laboratory*)

11:40 MgB2 HEB Mixers at Operation Temperatures above Liquid Helium Temperature  
Evgenii Novoselov (*Chalmers University of Technology*)

12:00 Experimental Studies of IF impedance of MgB2 HEB Mixers at Various Bias Conditions and Operation Temperatures  
Sergey Cherednichenko (*Chalmers University of Technology*)

12:20-14:00 Lunch Break

14:00-16:00 W3 Session: THz Receivers

(Chair: Valery Koshelets)

14:00 1.9 THz 4-Pixel Heterodyne Array Receiver  
Jonathan Kawamura (*Jet Propulsion Laboratory*)

14:20 The upGREAT THz Arrays for SOFIA: Successful Commissioning at 1.9 THz  
Netty Honingh (*University of Cologne*)

14:40 ( 4 ) 7 Pixels Prototype for a 230 GHz Multi-beam Receiver  
Doris Maier (*Institut de Radioastronomie Millimetrique*)

15:00 Ultra Low Noise 600/1200 GHz and 874 GHz GaAsSchottky  
Receivers for SWI and ISMAR  
Peter Sobis (*Omnisys Instruments AB*)

15:20 ( 3 ) 1200GHz and 600GHz SchottkyReceivers for JUICE-SWI  
Alain Maestrini (*Observatoire de Paris*)

15:40 874-GHz HeterodyneCubesat Receiver for Cloud Ice Measurements-  
Flight Model Data  
EricBryerton (*Virginia Diodes, Inc.*)

16:00-16:30 Coffee Break

16:30-18:30 W4 Session: THz Mixers &Detectors (II)

(Chair: Boris Karasik)

16:30 Ultra-low Noise TES bolometer Arrays for SAFARI Instrument on  
SPICA  
PouyaKhosropanah (*SRON Netherlands Institute for Space  
Research*)

16:50 Readout of a 160 Pixel FDM System for SAFARI TES Arrays  
RichardHijmering (*SRON Netherlands Institute for Space Research*)

17:10 TheSpaceKIDsProject: Development of Kinetic Inductance Detector  
Arrays for Space Applications  
Pete Barry (*Cardiff University*)

17:30 Terahertz Superconducting Imaging Array (TeSIA)  
ShengCaiShi (*Purple Mountain Observatory*)

17:50 Frequency Division Multiplexing withSuperconducting Tunnel  
Junctions as Rectifiers and Frequency Mixers  
Gerhard de Lange (*SRON Netherlands Institute for Space Research*)

18:10 ( 4 ) A 230 GHz Finline SIS Receiver with Wide IF Bandwidth  
John Garrett (*University of Oxford*)

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Thursday, April 14, 2016

8:30-10:20 T1 Session: THz Projects & Instruments (II)

(Chair: Tetsuo Hasegawa)

8:30 Beyond Herschel: Key Scientific Requirements for Future Far Infrared Facilities (Invited)  
Matt Griffin (*Cardiff University*)

9:00 Millimetron Space Observatory as a Scientific Instrument with Excellent Astronomical Capabilities  
Andrey Smirnov (*The Lebedev Physical Institute of the Russian Academy of Sciences*)

9:20 ICEMuSIC – A New Instrument Concept for Mm-wave Observations of Ice Clouds, and Temperature and Humidity Sounding from Space  
PeterHargrave (*Cardiff University*)

9:40 Terahertz Intensity Interferometry for Very High Angular Resolution Observations  
Hiroshi Matsuo (*National Astronomical Observatory of Japan*)

10:00 NOEMA: a Powerful mm Array in the Northern Hemisphere  
FrédéricGueth (*Institut de Radioastronomie Millimetrique*)

10:20-10:50 Coffee Break

10:50-12:30 T2 Session: Quantum Cascade Lasers

(Chair: JianRongGao)

- 10:50 Integrating THz Quantum Cascade Lasers to Flexible Dielectric-metallic Waveguides: Moving beyond Free Space Optics  
Harvey Beere (*University of Cambridge*)
- 11:10 Frequency Instabilities of Terahertz Quantum-Cascade Lasers Induced by Optical Feedback  
Heinz-Wilhelm Hübers (*German Aerospace Center, Institute of Optical Sensor Systems*)
- 11:30 Double Metal Quantum Cascade Laser with 2D Patch Array Antenna on a BCB Substrate with Gaussian Beam Shape for Local Oscillator Applications at 1.9THz  
Matthias Justen (*University of Cologne*)

11:50 ( 4 ) Frequency Locking and Monitoring Based on Bi-directional Terahertz Radiation of a 3rd-order Distributed Feedback QCL  
Jian Rong Gao (*SRON Netherlands Institute for Space Research*)

12:10 Spectral Modulation of Terahertz Quantum Cascade Lasers with Radio Frequency Injection Locking  
Hua Li (*Shanghai Institute of Microsystem and Information Technology*)

12:30-14:00 Lunch Break & SOC Meeting

14:00-16:40 T3 Session: THz Sources & Optics

(Chair: Scott Paine)

14:00 ( 5 ) Design Considerations for Amplifier/Multiplier Chain (AMC) for Low Noise Local Oscillator  
Edward Tong (*Harvard-Smithsonian CfA*)

14:20 ( 4 ) A 600GHz Tripler with >5mW and 6% Efficiency  
Hugh Gibson (*Gibson Microwave Design EURL*)

14:40 ( 3 ) Broadband Direct Machined Corrugated Horn for LiteBIRD  
Shigeyuki Sekiguchi (*University of Tokyo*)

15:00 ( 2 ) The Global Phase Grating  
Fabien Defrance (*Observatoire de Paris*)

15:20 Modal Analysis of Far-Infrared Multimode Horns and Waveguides for  
Ultra-Low-Noise Detectors for Astronomy  
JiaJun Chen (*University of Cambridge*)

15:40 ( 4 ) Research on High Precision Antenna for DATE5  
Zheng Lou (*Purple Mountain Observatory*)

16:00 Reconfigurable Beam Measurement System and Use for ALMA Band  
11 (1.25-1.57 THz)  
Alvaro Gonzalez (*National Astronomical Observatory of Japan*)

16:20 Air Liquide Cryogenic Space Coolers for Science Applications – Past,  
Present and Future  
Thierry Wiertz (*Air Liquide Advanced Technologies*)

16:40-18:40 T4 Session: Group Photo & Poster

19:00-21:00 Banquet

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Friday, April 15, 2016

8:30-10:20 F1 Session: THz Projects & Instruments (II)

(Chair: Matt Griffin)

8:30 Antarctic Observatory at Chinese Kunlun Station (Invited)  
Ji Yang (*Purple Mountain Observatory*)

9:00 4.7-THz Quantum-Cascade Laser for the upGREAT Array Heterodyne  
Spectrometer on SOFIA  
Heinz-Wilhelm Hübers (*German Aerospace Center, Institute of Optical  
Sensor Systems*)



9:20 Fast Terahertz Imaging using a Quantum Cascade Amplifier up to 20,000 pps  
Yuan Ren (*University of Cambridge*)

9:40 ( 4 ) The Sardinia Radio Telescope Front-Ends  
AlessandroNavarrini (*INAF-Radio Astronomy Observatory*)

10:00 ( 3 ) Multi-Gbit/s Data Transmission in Sub-Terahertz Range  
Zhe Chen (*University of Electronic Science and Technology of China*)

10:20-10:50 Coffee Break

10:50-12:30 F2 Session: THz Mixers & Detectors (III)

(Chair: Sergey Cherednichenko)

10:50 Study of Image Rejection Ratio of 2SB SIS receiver  
AndreyKhudchenko (*SRON Netherlands Institute for Space Research*)

11:10 A Zero-Bias Ultrasensitive THz Hot-Electron Direct Detector with Large Dynamic Range  
BorisKarasik (*Jet Propulsion Laboratory*)

11:30 Room-temperature Direct and Heterodyne Detectors Based on Field-effect Transistors  
Hua Qin (*Suzhou Institute of Nano-tech and Nano-bionics*)

11:50 Photon Counting Detector as a Mixer with Picowatt Local Oscillator Power Requirement  
MichaelShcherbatenko (*Moscow State Pedagogical University*)

12:10 Development of a 2 THz Solid-state Radiometer for Atmospheric Sounding  
JeanneTreuttel (*Jet Propulsion Laboratory*)

12:30-12:40 Closing

12:40-14:00 Lunch

14:00-17:00 Tour to Purple Mountain Observatory & SMLab

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T4: Poster Session

- P1 ( 4 ) Broken Photon-step Phenomenon in SIS Mixers  
AndreyErmakov (*Chalmers University of Technology*)
- P2 ( 3 ) Development of 1.5 THz Cartridge-type Multi-pixel Receiver Based on  
HEB Mixers  
YenRu Huang (*Institute of Astronomy and Astrophysics, Academia  
Sinica*)
- P3 Photon Noise Limited Performance over an Octave of Bandwidth of  
Kinetic Inductance Detectors for Sub-millimeter Astronomy  
JuanBueno (*SRON Netherlands Institute for Space Research*)
- P4 Gap Frequency and Photon Absorption in a Hot Electron Bolometer  
AndreyTrifonov (*Harvard-Smithsonian CfA*)
- P5 Frequency Agile Heterodyne Detector for SubmillimeterSpectroscopy  
of Planets and Comets  
Jonathan Kawamura (*Jet Propulsion Laboratory*)
- P6 Characterization of a Free-standing Membrane Supported  
Superconducting Ti Transition Edge Sensor  
Wen Zhang (*Purple Mountain Observatory*)
- P7 A HEB Waveguide Mixer Operating with a Waveguide QCL at 1.9 THz  
DenisBüchel (*University of Cologne*)
- P8 Single Junction Design for 790-950GHz SIS Receiver  
KirillRudakov (*The Kotel'nikov Institute of Radio Engineering and  
Electronics*)

- P9            A 1080-1280 GHz Sub-Harmonic Biasable Schottky Front-end Design for Planetary Science and Remote Sensing  
Diego Moro-Melgar (*Observatoire de Paris*)
- P10            Development of an RF Waveguide Frequency Multiplexer for a Multiband Heterodyne System  
Takafumi Kojima (*National Astronomical Observatory of Japan*)
- P11            Concept Design of a Dual-Polarization Sideband-Separating Multi-Pixel SIS Receiver  
WenLei Shan (*National Astronomical Observatory of Japan*)
- P12            Development of Terahertz SIS Mixers Using Nb/AlN/Nb Tunnel Junctions Integrated with All NbTiN Tuning Circuits  
Yoshinori Uzawa (*National Institute of Information and Communications Technology*)
- P13 ( 2 )      Gas Cell Measurement using an HEBM with a Phase-locked THz-QCL as a Local Oscillator at 3 THz Band  
Yoshihisa Irimajiri (*National Institute of Information and Communications Technology*)
- P14 ( 3 )      Critical Temperature Dependence of the Noise Temperature and IF Bandwidth of Superconducting Hot Electron Bolometer Mixers  
Wei Miao (*Purple Mountain Observatory*)
- P15            Study of the Properties of TiN Superconducting Films for Microwave Kinetic Inductance Detectors  
Jing Li (*Purple Mountain Observatory*)
- P16            Shot Noise in NbN Distributed Superconducting Tunneling Junctions  
Dong Liu (*Purple Mountain Observatory*)
- P17 ( 3 )      A 4.7 THz HEB QCL Receiver for STO<sub>2</sub>  
Darren Hayton (*SRON Netherlands Institute for Space Research*)

- P18 ( 2 )      Room Temperature Terahertz SubHarmonic Mixer Based on GaN Unipolar Nanochannels  
FeiYang (*Southeast University*)
- P19              Development of Wideband 100-GHz SIS Mixers for a New Multi-beam Receiver  
YutoKozuki (*Osaka Prefecture University*)
- P20 ( 4 )      Fabrication of NbN-based Hot Electron Bolometer Mixers by Standard UV Lithography  
Christine Chaumont (*Observatoire de Paris*)
- P21              A new Two-way Power Divider/Combiner Based on Magic T in W-Band  
Hong Tang (*University of Electronic Science and Technology of China*)
- P22 ( 2 )      Electron Gun Design for a 170 GHz Megawatt-level Corrugated Coaxial Gyrotron  
Kun Dong (*University of Electronic Science and Technology of China*)
- P23 ( 4 )      Design of Q-band Broadband RectangularWaveguide TE<sub>10</sub>Mode to CircularWaveguide TE<sub>01</sub> Mode Converter  
ShuaiZong (*University of Electronic Science and Technology of China*)
- P24 ( 3 )      A Novel Wideband Antipodal Fin-line Waveguide-to-Microstrip Transition Structure for Ka-band Applications  
Bo Fang (*University of Electronic Science and Technology of China*)
- P25              Design of a Novel Nonlinear Curve Coupling Waveguide Coupler for Sheet Beam Travelling Wave Tube  
LiYa Yang (*University of Electronic Science and Technology of China*)
- P26 ( 4 )      Design of a Ka-band HE<sub>11</sub> Mode Corrugated Horn for the Faraday Rotator  
Fang Li (*University of Electronic Science and Technology of China*)

- P27            High Current Density Impregnated Scandate Cathode for Terahertz Vacuum Devices  
YeFen Shang (*University of Electronic Science and Technology of China*)
- P28 ( 2 )      Research on Gyrotron Traveling Wave Amplifier with LossyDielectric-Load Waveguide  
Na Liu (*University of Electronic Science and Technology of China*)
- P29 ( 4 )      Measurements of Dielectric Properties near100GHz using a Reflection-Type Hemispherical Open Resonator  
Hao Li (*University of Electronic Science and Technology of China*)
- P30 ( 3 )      A Novel Design of Waveguide-Coax Millimeter-wave Equalizer  
LiuSha Yang (*University of Electronic Science and Technology of China*)
- P31            A TE<sub>13</sub> Mode Input Converter for 0.1THz High Order Mode Gyrotron Travelling Wave Amplifiers  
Yan Wang (*University of Electronic Science and Technology of China*)
- P32 ( 4 )      Optical Testing of the CAMbridge Emission Line Surveyor(CAMELS)  
LingZhenZeng (*Harvard-Smithsonian CfA*)
- P33            Design and Simulation of Interaction Structure for 110GHz Second-Harmonic Gyro-TWT  
Nan Huang (*University of Electronic Science and Technology of China*)
- P34 ( 3 )      A 15Gps High Speed OOK Receiver Based on a 0.34THz Zero-bias SchottkyDiode Detector  
YaoLingTian (*China Academy of Engineering Physics*)
- P35 ( 3 )      Improvement on 1.2 Hz Total Power Instability of KVN 129 GHz SIS Mixer Receiver  
Jung-Won Lee (*Korea Astronomy and Space Science Institute*)
- P36 ( 2 )      Investigation of Tunnel Superconducting Junction Mixing Regimes

Anton Artanov (*The Kotel'nikov Institute of Radio Engineering and Electronics*)

P37 ( 4 ) Development of a Millimeter Wave Grating Spectrometer for TIME Pilot

ChaoTe Li (*Academia Sinica Institute of Astronomy and Astrophysics*)

P38 Terahertz Imaging Progress at Capital Normal University  
GuoZhong Zhao (*Capital Normal University*)

P39 ( 2 ) Development of a 71-116GHz RF Module for the EMIR Receiver Upgrade

Anne-Laure Fontana (*Institut de Radioastronomie Millimetrique*)

P40 ( 6 ) Superconducting Local Oscillators: Development and Optimization  
Pavel Dmitriev (*The Kotel'nikov Institute of Radio Engineering and Electronics*)

P41 Improvement of the Planar Schottky Diode Capacity Model for the Implementation in the Non-linear Harmonic Balance ADS Simulator for Multipliers Design  
Diego Moro-Melgar (*Observatoire de Paris*)

P42 ( 3 ) Design of a Terahertz Wire-wrap Backward-Wave Oscillator  
ChangPeng Xu (*University of Electronic Science and Technology of China*)

P43 ( 3 ) Design and Analysis of a Y-band Extended Interaction Oscillator with a Pseudospark-Sourced Electron Beam  
Zhang Zhang (*University of Electronic Science and Technology of China*)

P44 ( 3 ) 340 GHz Frequency Multiplier with Unbalance Circuit Based on One Schottky Diodes Chip  
Jun Jiang (*Institute of Electronic Engineering*)

P45 ( 4 ) A Multiple-Bridges Planar Superconducting Switch at Millimetre Frequencies

Boon Kok Tan (*University of Oxford*)

P46 Broadband Antireflective Subwavelength Structures for Large Diameter Silicon Lenses

Tom Nitta (*University of Tsukuba*)

P47 Beam Pattern Measurements of a Picket-Potter Feed Horn at 1.9 THz  
Jenna Kloosterman (*Jet Propulsion Laboratory*)

P48 ( 2 ) Transmission and Reflection Properties of Dielectric Materials for THz Instrumentation

Anastasiia Pienkina (*Observatoire de Paris*)

P49 Corrugated Horns for ALMA band 11 (1.25-1.57 THz)  
Alvaro Gonzalez (*National Astronomical Observatory of Japan*)

P50 ( 3 ) Fast On-the-Fly Near-field Antenna Measurement at 500GHz

Jie Hu (*Purple Mountain Observatory*)

P51 A Three-disc Window Based on Triangular Lattice of Dielectric Rods for High Power Gyro Amplifiers

YeLei Yao (*University of Electronic Science and Technology of China*)

P52 ( 3 ) A WR-4 Optically-Tunable Waveguide Attenuator with 50 dB Tuning Range and Low Insertion Loss

Zhenguo Jiang (*University of Notre Dame*)

P53 ( 2 ) Development of Sub-micron High Precision Carbon Fiber Reflector

Liang Xu (*Xi'an Institute of Optics and Precision Mechanics of CAS*)

P54 ( 3 ) Development of Octave-band Planar Ortho-Mode Transducer with MKID for LiteBIRD Satellite

ShiboShu (*University of Tokyo*)

P55 ( 2 ) Metamaterials-based Terahertz Filter

ZhenYu Zhao (*Shanghai Normal University*)

P56 Investigation of Temperature Dependence of Terahertz Spectra of  
Amino Acids  
Ling Jiang (*Nanjing Forestry University*)

P57 ( 2 ) Measurement of 460 GHz Atmospheric Opacity at Delingha  
Sheng Li (*Purple Mountain Observatory*)