Proceedings

22nd International Symposium on Space Terahertz Technology

April 25-28, 2011

Loews Ventana Canyon Resort,Tucson, AZ USA

The 22nd International Symposium on Space Terahertz Technology was held from April 25 to April 28 in Tucson, Arizona, USA at the Loews Ventana Canyon resort. There were ~110 registered participants at the conference. Engineers and scientists from the United States, the European Union, Japan, Russia, Chile and China attended.

The local organizing committee would like to thank the conference manager Brian Duffy and his staff for making the 22nd ISSTT an enjoyable and smooth event. Their many hours of hard work made the conference possible.

All submitted manuscripts have been included in these proceedings. For presentations without a submitted manuscript, the presentation abstract has been included in the proceedings. Authors at this ISSTT had the opportunity to submit their paper to a special issue of the IEEE Transactions on Terahertz Science and Technology. Papers accepted by the TST journal through this process will be published in the January 2012 issue of the TST. Digest versions of these papers are included in these conference proceedings.

51 oral, 31 poster and 7 invited presentations were given at the conference in five broad categories:

Coherent Detectors:	20
Direct Detectors:	11
THz Sources:	11
Components and Optics:	17
Systems:	22
Invited:	7

The 23rd International Symposium on Space Terahertz Technology will be held in Tokyo, Japan from April 2-4 2012. Further details are available at http://atc.mtk.nao.ac.jp/ISSTT2012/index.htm.

Chris Walker and Chris Groppi
Conference Co-Chairs

Conference Location

Loews Ventana Canyon Resort
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Local Organizing Committee

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Christopher Groppi, Arizona State (Co-Chair)
Christian d'Aubigny, TeraVision Inc.
Craig Kulesa, U. Arizona
Gene Lauria, U. Arizona

Scientific Organizing Committee

Christopher Walker, U. Arizona
Christopher Groppi, Arizona State
Christian d'Aubigny, TeraVision Inc.
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Jon Kawamura, NASA Jet Propulsion Laboratory
Victor Belitsky, Chalmers University of Technology
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ISSTT 2011 Program

Monday, April 25, 2011

19:00-21:00: Welcome gathering and registration, Hotel main lobby patio

Tuesday, April 26, 2011

8:00-8:30: Continental breakfast and registration

8:30-8:50: Announcements and Conference Welcome: Prof. Christopher Walker

8:50-10:10: Session 1 Terahertz Systems I (Chair: Christopher Groppi)

Paper	Abstract Title	Presenter
1-1	THz Interferometers in Geosynchronous Orbit,- status and results	Anders Emrich
1-2	Liquid-cryogen free frontend for a 2.5-THz heterodyne receiver	Heinz-Wilhelm Huebers
1-3	Towards Multi- Pixel Heterodyne Terahertz Receivers	Victor Belitsky
1-4	Antenna coupled KIDs for NIKA	Lorenza Ferrari

10:10-10:30 Coffee Break

10:30-11:00 Invited Talk: "Millimeter and Submillimeter Observations of Asteroids and Comets With the MIRO Instrument on the Rosetta Spacecraft"

Dr. Samuel Gulkis, NASA JPL

11:00-12:20: Session 2: Coherent Detectors I (Chair: Jacob Kooi)

Paper	Abstract Title	Presenter
2-1	Radiation mixer based on the 2DEG in a GaN heterostructure	Boris Karasik
2-2	Integrated Balanced SIS Mixer at 500 GHz	Marc Westig
2-3	Performance of a twin slot antenna coupled NbN hot electron bolometer mixer at 2.5 THz	Wen Zhang
2-4	Nb/Al-AlOx/Nb junction properties' variations due to storage and mounting	Alexey Pavolotsky

12:20-13:20: Lunch Break

Meeting of ISSTT Steering Committee (continue on Wednesday if necessary)

13:20-15:00: Session 3: THz Sources I (Chair: Tom Crowe)

Paper	Abstract Title	Presenter
3-1	Steady-State and Transient Thermal Analysis of High-Power Planar Schottky Diodes	Aik-Yean Tang
3-2	Design of a high-power 1.6 THz Schottky tripler using 'on-chip' power-combining and Silicon micro-machining	Jose Siles
3-3	Fundamental-Mode Operation of Superlattice Electronic Devices in D-Band (110–170 GHz)	Heribert Eisele
3-4	Power Combined Gallium Nitride Amplifier with 3 Watt Output Power at 87 GHz	Andy Fung
3-5	A 2.5-2.7 THz room temperature electronic source	Alain Maestrini

15:00-15:20: Coffee Break

15:20-15:50: Invited Talk: "Future Incoherent Detector Arrays"

Dr. Harvey Moseley, NASA GSFC

15:50-17:10: Session 4: Incoherent Detectors I (Chair: Teunis Klapwijk)

Paper	Abstract Title	Presenter
4-1	Lumped Element Kinetic Inductance Detectors for NIKA	Markus Roesch
4-2	The SPICA-SAFARI Detector System: TES Detector Arrays with Frequency Division Multiplexed SQUID Readout	P. De Korte
4-3	A Study on Photon Counting Interferometry in Terahertz Frequencies	Hiroshi Matsuo
4-4	Optical characterization at 1.5-3 THz of high sensitivity TES detectors designed for future Far-Infrared Space missions	Phil Mauskopf

17:30-19:00: Poster Session and Reception

Paper	Abstract Title	Presenter
P-1	Kilopixel Superconducting Bolometer Arrays for Near-Space Astrophysics Applications	Dominic Benford
P-2	Performance of first ALMA band 5 production cartridge	Bhushan Billade
P-3	Receiver Optics and 1.9 THz HEB Mixers for STO	Michael Brasse
P-4	Compact Micromachined Infrared Bandpass Filters for Planetary Spectroscopy	Ari Brown
P-5	Measure the beam wavefronts of a terahertz source	Morris Cui
P-6	Light-tight cryogenic test facility development for the SAFARI instrument on-ground calibration	Pieter Dieleman

P-7	Development of planar Schottky diodes	Vladimir Drakinskiy
P-8	Design, Fabrication and Alignment of the SuperCam Telescope Relay Optics	Christian Drouet d'Aubigny
P-9	Phocus radiometer payload	Anders Emrich
P-10	Spectrometers for THz radiometers	Anders Emrich
P-11	STEAMR breadboard results and demonstrator status	Anders Emrich
P-12	ALMA WVR final report	Anders Emrich
P-13	Antenna lens array for large scale M-KIDs camera	Lorenza Ferrari
P-14	Optical test facility for SAFARI bolometers	Lorenza Ferrari
P-15	The Supercam 8-pixel integrated focal plane unit	Christopher Groppi
P-16	The Supercam Local Oscillator Multiplexing Unit: Design, fabrication and measured performance	Christopher Groppi
P-17	Terahertz response of YBCO HEB homodyne detectors	Arvid Hammar
P-18	YBCO HEB THz mixers	Arvid Hammar
P-19	"32-channel Multi-Chip-Module" The Cryogenic Readout System for Submillimeter/Terahertz Cameras	Yasunori Hibi
P-20	1.1 THz Multi-pixel Heterodyne Receiver for APEX	Norma Hurtado
P-21	Development of THz Quantum Cascade Laser as a Local Oscillator for Heterodyne Receivers	Yoshihisa Irimajiri
P-22	In-orbit Performance and Current Status of the SMILES Mission	Kenichi Kikuchi
P-23	Operating of the superconducting integrated receiver channel of the TELIS atmospheric sounder.	Oleg Kiselev
P-24	Dual-Chip Power Combiner using 300 GHz Tripler with Diamond Heat-Spreaders	Choonsup Lee
P-25	Initial Terahertz Probing of Carbon Nanofiber Composite Coatings as Potential Quasi-Optical THz Shielding and Attenuation Devices	Lei Liu
P-26	A Truncated Waveguide Phase Shifter	N.P. Lourie
P-27	Advances Towards an ALMA Band-1 Receiver	Patricio Mena
P-28	Test of a Waveguide OMT for the 385-500 GHz Band	Alessandro Navarrini
P-29	TES Bolometers with High-Frequency Readout Circuit	Sergey Shitov
P-30	Status of ALMA Band 7 Cartridge Production	Sylvain Mahieu
P-31	A 230 GHz Unilateral Finline Mixer on Silicon Substrate	Yangjun Zhou
P-32	3.5 THz Quantum Cascade Laser at 70 K as local oscillator	Ren Yuan

20:00-22:00: Community Forum: Research Opportunities in Terahertz Astronomy

Wednesday, April 27, 2011

8:00-8:30: Continental Breakfast and Registration

8:30-9:00: Invited Talk: "The South Pole Telescope: Operations and Early Results"

Dr. Antony Stark, Harvard-Smithsonian CfA

9:00-10:20 Session 5: Incoherent Detectors II (Chair: Harvey Moseley)

Paper	Abstract Title	Presenter
5-1	Doped Lead Telluride-Based Alloys – a New Type of Sensitive Detectors of Terahertz Radiation	Dmitry Kokhlov
5-2	Optical sensitivity measurements in nano-HEB detectors	Boris Karasik
5-3	Low Noise Transition Edge Sensor (TES) for the SAFARI Instrument on SPICA	Pourya Khosropanah
5-4	Optical characterization of high sensitivity TES detectors designed for the SPICA/SAFARI 30-60 mm channel	D. Morozov

10:20-10:40: Coffee Break

10:40-12:20 Session 6: Coherent Detectors II (Chair: Patrick Puetz)

Paper	Abstract Title	Presenter
6-1	Scalable terahertz-frequency HEB mixers	Faouzi Boussaha
6-2	A quasi-optical NbN mixer with 800K DSB noise temperature at 2.5 THz	Yan Delorme
6-3	560 GHz, 664 GHz and 1.2 THz Schottky based MMIC sub-harmonic mixers for planetary atmospheric remote sensing	Thomas Bertrand
6-4	First Results of the Sideband-Separating Mixer for ALMA Band 9 Upgrade	Andrey Khudchenko
6-5	High Sensitivity Waveguide HEB Mixers at 2.5 THz	Patrick Puetz

12:20-13:20: Lunch Break

13:20-13:50: Invited Talk: "CCAT"

Dr. Jonas Zmuidzinas, Caltech/JPL

13:50-14:50 Session 7: Optics and Components (Chair: Christian d'Aubigny)

Paper	Abstract Title	Presenter
7-1	The experimental demonstration of a low-cost 37-horn focal-plane array consisting of smooth-walled multiple-flare angle horns fabricated by direct drilling	Jamie Leech
7-2	Effect of Phase Slippage and Higher Order Beam Modes in a 340GHz Focal Plane Array Optics	Axel Murk
7-3	VNA Measurements in the 0.75-1.1 THz Band	Jeffrey Hesler

14:50-15:10 Session 8: THz Systems II (Chair: Victor Belitsky)

Paper	Abstract Title	Presenter
8-1	A Multibeam 2SB SIS Receiver at 3mm Wavelength	Wenlei Shan

15:10-15:30: Coffee Break

15:30-16:00 Invited Talk: "SOFIA"

Dr. Erick Young

16:00-17:20 Session 8: THz Systems II continued

Paper	Abstract Title	Presenter
8-2	Development of the 1.3-1.5 THz Band Superconducting HEB Mixer Receivers for ASTE 10 m Telescope	Tatsuya Shiino
8-3	Heterodyne molecular spectroscopy measurement at 3.5 THz using a tunable quantum cascade laser	Ren Yuan
8-4	Antenna Coupled MKID test camera on APEX telescope: on sky perfomace	Andrey Baryshev
8-5	The Kilopixel Array Pathfinder Project (KAPPa): A 16 pixel 660 GHz pathfinder instrument with an integrated heterodyne focal plane detector	Christopher Groppi

18:30 Reception and Conference Dinner

Invited Talk: "THz Astronomy, Past, Present and Future,"

Dr. Thijs de Graaw, ALMA

Thursday, April 28

8:00-8:30: Registration and Continental Breakfast

8:30-9:00: Invited Talk: "Exploring the Terahertz Universe: Capabilities and Early Science Results of the Herschel Space Observatory"

Paul Goldsmith, NASA JPL

9:00-10:40 Session 9: THz Systems III (Chair: Andrey Baryshev)

Paper	Abstract Title	Presenter
9-1	The Stratospheric Terahertz Observatory	Christopher Walker
9-2	A progress update on Supercam, a 64-pixel heterodyne imaging spectrometer	Jenna Kloosterman
9-3	HEAT: The High Elevation Antarctic THz Telescope	Craig Kulesa
9-4	Status report on the Caltech Submillimeter Observatory Receiver Upgrade	Jacob Kooi
9-5	First results from GREAT on SOFIA	Jurgen Stutzki

10:40-11:00: Coffee Break

11:00-12:20 Session 10: Coherent Detectors III (Chair: Gene Lauria)

Paper	Abstract Title	Presenter
10-1	Next Generation of Hot-Electron Bolometer Mixers for Future Heterodyne Missions	Sergey Ryabchun
10-2	Characterisation of broadband unilateral finline SIS mixers with sideband separation at 700GHz	Boon-Kok Tan
10-3	670 GHz Schottky Diode Based Subharmonic Mixer with CPW Circuits and 70 GHz IF	Goutam Chattopadhyay
10-4	Cryogenic MMIC Low Noise Amplifiers for W-Band and Beyond	Lorene Samoska

12:20-13:20: Lunch Break

13:20-13:50: Invited Talk: "THz Transistors"

Bill Deal, Northrop Grumman Corporation

13:50-14:30 Session 10: Coherent Detectors III Continued

Paper	Abstract Title	Presenter
10-5	Upgrade of EMIR's band 3 and band 4 mixers	Doris Maier
10-6	A 340 GHz 2SB Schottky Receiver for Earth Observation Applications	Peter Sobis

14:30-15:30 Session 11: THz sources II (Chair: Imran Mehdi)

Paper	Abstract Title	Presenter
11-1	Frequency locking of a 3.5 THz quantum cascade laser using a gas cell	Ren Yuan
11-2	High power room temperature, compact, narrow line THz source as a local oscillator for THz receivers	M. Scheller
11-3	Development and Characterization of a 2.7THz LO Source	Thomas Crowe

15:30-15:50: Coffee Break

15:50-16:30 Session 11: THz Sources II continued

Paper	Abstract Title	Presenter
11-4	Toward a Terahertz Local Oscillator for SOFIA Based on a Quantum-Cascade Laser	Heiko Richter
11-5	Verification of Spectral Purity in the HIFI Local Oscillator	John Pearson

16:30-17:10 Session 12: Components and Optics II (Chair: Christian d'Aubigny)

Paper	Abstract Title	Presenter
12-1	Experimental Demonstration of a New Technique for Characterizing the Full Optical Behavior of Multimode Detectors	Chris Thomas
12-2	Silicon Micromachining Technology for THz applications: Development of Silicon Based Integrated Receivers	Cecile Jung

17:10-17:30 Closing remarks and adjourn

List of Registered Participants

Joost Adema
Maestrini Alain
Jan Barkhof
Andrey Baryshev
Victor Belitsky
Menno van de Bemt
Bhushan Billade
Faouzi Boussaha
Michael Brasse
Ari D. Brown
Eric Bryerton
Robbie M. Burton
Thomas Crowe
Morris Cui
Thijs de Graauw
William R. Deal
Yan Delorme
Pieter Dieleman
Jack East
Heribert Eisele
Anders Emrich
Lorenza Ferrari
Andy Fung
Jian-Rong Gao
Paul Goldsmith
Grigori Goltsman
Christopher E. Groppi
Samuel Gulkis
Arvid Hammar
Darren J. Hayton
Jeffrey Hesler
Ronald Hesper
Yasunori Hibi
Matt Hollister
Heinz-Wilhelm Huebers
Norma Hurtado
Yoshihisa Irimajiri
Brian D. Jackson
Jeanne Treuttel
Cecile Jung
Boris Karasik
Alexandre Karpov
Jonathan Kawamura
Dmitry Khokhlov
Kenichi Kikuchi
Oleg Kiselev
Teun Klapwijk
Jacob Kooi
Eugene F. Lauria
Choonsup Lee

Jamie Leech

Robert Lin

Sarah Lipscy

Lei Liu

Sylvain Mahieu

Doris Maier

Dan P. Marrone

Hiroshi Matsuo

Imran Mehdi

Willie C. Merrell

Raquel Monje

Tetsuo Mori

Axel Murk

Alessandro Navarrini

Shing-Kuo Pan

Alexey Pavolotsky

Patrick Puetz

Theodore Reck

George P. Reiland

Yuan Ren

Heiko Richter

Markus Roesch

Karwan Rostem

Kamaljeet Saini

Lorene Samoska

Yutaro Sekimoto

Wenlei Shan

Sheng-Cai Shi

Jerry Shiao

Tatsuya Shiino

Jose Siles

Brian A. Stalder

Antony A. Stark

Juergen Stutzki

Boon Kok Tan

Aik Yean Tang

David J. Thoen

Christopher N. Thomas

Todd Veach

Caleb Wheeler

Erick T. Young

Jonas Zmuidzinas