GOUTAM CHATTOPADHYAY

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Education

Ph.D. Electrical Engineering — September 1999.
California Institute of Technology, Pasadena, CA, USA.
Thesis title: Dual Polarized and Balanced Receivers at Millimeter and Submillimeter Wavelengths.
Thesis adviser: Prof. Jonas Zmuidzinas.

MS Electrical Engineering — January 1995.
University of Virginia, Charlottesville, VA, USA.
Thesis title: A Quasi-Optical Ka-Band Subharmonic Mixer with Separately Biased Diodes on a Planar Antenna.
Thesis Adviser: Prof. Robert M. Weikle II.

B. E. Electronics and Telecommunication Engineering — June 1987.
Bengal Engineering College, Calcutta University (currently IIEST), Calcutta, INDIA.

Positions Held

Senior Research Scientist — Mar. 2015 – Present.
NASA-Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA.

Visiting Associate — Mar. 2006 – Present.
Division of Physics, Mathematics, and Astronomy, California Institute of Technology, Pasadena, CA, USA.

Principal Engineer — Mar. 2012 – Feb. 2015.
NASA-Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA.

Senior Member of the Engineering Staff — Feb. 2005 – Feb. 2012.
NASA-Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA.

Senior Member of the Research Staff — Dec. 2001 – Feb. 2005.
George Downs Laboratory of Physics, California Institute of Technology, Pasadena, CA, USA.

Member of the Research Staff — Oct. 1999 – Nov. 2001.
George Downs Laboratory of Physics, California Institute of Technology, Pasadena, CA, USA.

Graduate Research Assistant — Sep. 1994 – Sep. 1999.
Department of Electrical Engineering, California Institute of Technology, Pasadena, CA, USA.

Graduate Research Assistant — Jan. 1993 – Aug. 1994.
Department of Electrical Engineering, University of Virginia, Charlottesville, VA, USA.

Design Engineer — Nov. 1987 – Dec. 1992.
Tata Institute of Fundamental Research, Bombay, India.

Honors and Awards

- Thirty NASA Invention Awards for work primarily in the submillimeter wavelengths presented by the National Aeronautics and Space Administration, USA – 2005-2017.
- Eighteen United States Patents – 2006-2017.
- IIEST Distinguished Alumni Award – 2017.
- European Conference on Antennas and Propagation (EuCAP) Best Paper Award – 2017.
- Indian Institute of Science, Bangalore, India BEL Distinguished Chair Professor – 2016-2017.
- IETE Prof. S. N. Mitra Memorial Award – 2014.
- IEEE Distinguished Microwave Lecturer Award: 2014-2016.

- IEEE Transactions on Terahertz Science and Technology Best Paper Award – 2014.
- Group Awards for submillimeter-wave frequency multiplier designs, Herschel HIFI instrument design, Herschel SPIRE design, and Terahertz Radar design presented by the NASA-Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA – 2005, 2007, 2009, 2011, and 2014.
- JPL Mariner Award – 2013.
- Award of Excellence presented by the NASA-Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA for Exceptional Technical Excellence – 2001, 2003, and 2006.
- IEEE Microwave Theory and Techniques Society (IEEE MTT-S) Graduate Fellowship Award – 1997.
- Jawharlal Nehru Graduate Fellowship Award in Engineering presented by the Government of India – 1992.
- Best Undergraduate Student Award presented by the University of Calcutta, India – 1987.

Professional Memberships and Other Positions

- Fellow of the Institute of Electrical and Electronic Engineers (IEEE), USA.
- Fellow of the Institute of Electronics and Telecommunications Engineers (IETE), India.
- IEEE Distinguished Microwave Lecturer (IEEE Microwave Theory and Techniques Society).
- Associate Editor, IEEE Transactions on Antennas and Propagation Journal.
- Chair of the IEEE Microwave Theory and Techniques Society's Technical Coordination Committee on Terahertz Technology and Applications (MTT-4).
- Member of the IEEE Microwave Theory and Techniques Society's Technical Coordination Committee on RF Nanotechnology (MTT-25).
- BEL Visiting Distinguished Chair Professor, Indian Institute of Science, Bangalore.
- Member of the editorial board for the IEEE Transactions on Microwave Theory and Techniques Journal.
- Member of the editorial board for the IEEE Transactions on Terahertz Science and Technology Journal.
- Member of the editorial board for the IEEE Transactions on Antennas and Propagation Journal.
- Member of the editorial board for the IEEE Microwave and Wireless Components Letters Journal.
- Member of the editorial board for the IEEE Antennas and Wireless Propagation Letters Journal.
- Member of the editorial board for the IEEE Transactions on Image Processing Journal.
- Member of the editorial board for the Journal of Infrared, Millimeter, and Terahertz Waves.
- Member of the editorial board for the Journal of Applied Physics.
- Member of the editorial board for the Journal of Selected Topics in Quantum Electronics.
- Member of the editorial board for the Review of Scientific Instruments Journal.
- Member of the editorial board for the Nature Photonics.
- Member of the editorial board for the Proceedings of IEEE.
- Member of the editorial board for the International Journal on Smart Sensing and Intelligent Systems.
- Member of the Technical Program Committee, IEEE International Microwave Symposium.
- Member of the Technical Program Committee, International Conference on Sensor Technology.
- Convener for the Submillimeter-Wave Astronomy, URSI General Assembly.
- Reviewer for NASA, NSF, DARPA, and others.
- Member of the review board for Australian Research Council, Swedish National Space Board, and Netherlands Organization for Scientific Research
- Life Member of Eta Kappa Nu – Electrical Engineering Honor Society.

Research Activities

Principal Investigator and Co-Investigator February 2005 – Present.

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA.

- Designed and developed the T-Slot dual-polarized array antenna that was used on the BICEP2 instrument for detection of the B-mode polarization of the Cosmic Microwave Background (CMB) radiation.
- JPL Principal Investigator (PI) for the development of terahertz transistors with Northrop Grumman Corporation for DARPA terahertz program.

- Principal Investigator (PI) for NASA Planetary Science Programs (MatISSE, PIDDP, and others). Working on the development of room-temperature submillimeter-wave instruments for planetary atmospheric and surface property measurements from orbit using dual-polarized and sideband separating receiver architecture. These very low-power and low-mass instruments are intended for future Mars, Jupiter-Europa, Saturn-Titan, and other missions.
- Principal Investigator (PI) for NASA Earth Science Technology Program. Developing MMIC mixers and multipliers using HEMT transistors working in the 300-850 GHz frequency band.
- Principal Investigator (PI) of NASA Astrophysics Research and Analysis Program working on a multi-pixel 1.9 THz receiver array instrument for astrophysics applications. Co-Investigator on several other NASA Astrophysics Programs.
- Co-Investigator on NASA Instrument Incubator Program (IIP), developing high electron mobility transistor (HEMT) based cryogenic receivers at 340 GHz band for the Scanning Microwave Limb Sounder (SMLS) instrument on NASA's future Earth observing mission Global Atmospheric Composition Mission (GACM).
- Co-Investigator on NASA ROSES program developing coupling structures for superconducting spectrometer on a chip.
- Working on an ultra-compact spectrometer on a chip using superconducting transmission line resonators that uses Microwave Kinetic Inductance Detectors (MKID) for astrophysics applications.
- Co-Investigator on NASA's planetary science program developing a radar spectrometer instrument at terahertz frequencies for planetary exploration.
- Co-Investigator for a DHS program for the development of multi-pixel frequency modulated continuous wave (FMCW) radar operating in the 670 GHz range.
- Involved in the design and development of the polarization detection instrumentation for the next generation cosmic microwave background (CMB) space missions.
- Working on the design and development of silicon micro-machined array receivers at submillimeter wavelengths for compact, multi-functional, highly sensitive receivers in the 500-600 GHz band.
- Working on HEMT based local oscillator sources to reduce power requirements for planetary instruments.

Invited Lectures

More than 150 Invited lectures. Lists only the 2017-2015 lectures:

- G. Chattopadhyay, "Terahertz Science, Technology, and Applications," Plenary Address at the European Conference on Antennas and Propagation (EuCAP), Paris, France, March 2017.
- G. Chattopadhyay, "Space Science and Instruments at NASA," American Center, US Consulate in Kolkata, India, Feb. 2017.
- G. Chattopadhyay, "Terahertz Heterodyne Instrument Designs for Space Applications," University of California, Los Angeles, February 2017.
- G. Chattopadhyay, "Space Technology and its Applications," University of Engineering and Management, Kolkata, India, February 2017.
- G. Chattopadhyay, "Space Instruments and Technology at Terahertz Frequencies," Institute Lecture, Indian Institute of Science, Bangalore, India, December 2016.
- G. Chattopadhyay, "Terahertz Technology and its Applications," Plenary Address, IEEE UEMCON, New York, October 2016.
- G. Chattopadhyay, "RF Silicon Chips for Wireless and Space Applications," CDoT Foundation Day Lecture, New Delhi, India, August 2016.
- G. Chattopadhyay, "Terahertz Technology and its Applications: Is it All Hype?" Plenary Address, International Symposium on Low Power Electronics Design, San Francisco, California, USA, August 2016.
- G. Chattopadhyay, "Silicon Micromachined Terahertz Focal Plane Array," Technical University, Delft, The Netherlands, June 2016.
- G. Chattopadhyay, "NASA Space Instruments," University of Davis, Davis, California, USA, April 2016.
- G. Chattopadhyay, "Space Science Instrument Development at NASA," Zewail City of Science and Technology, Cairo, Egypt, March 2016.
- G. Chattopadhyay, "Terahertz Radar Instruments for Space and Ground Based Applications," Indian Institute of Technology, Kanpur, India, February 2016.
- G. Chattopadhyay, "Are Cubesats the Future of Space Exploration and Connecting the World?" Plenary Lecture at the International Radar Symposium India (IRSI), Bangalore, India, December 2015.
- G. Chattopadhyay, "Terahertz Technology and Its Applications," IEEE Distinguished Lecture, Queen's University, Kingston, Ontario, Canada, November 2015.
- G. Chattopadhyay, "Terahertz Technology and Its Applications," Invited Lecture at the University of Sao Paulo, Sao Paulo, Brazil, September 2015.

- G. Chattopadhyay, "Terahertz Technology and Its Applications," IEEE Distinguished Lecture, University of Waterloo, Waterloo, Canada, July 2015.
- G. Chattopadhyay, "Terahertz Radar for Stand-Off Through-Clothes Imaging," IEEE Distinguished Lecture, Institut d'Electronique de Microelectronique et de Nanotechnologie (IEMN), Lille, France, July 2015.
- G. Chattopadhyay, "Terahertz Technology and Its Applications," IEEE Distinguished Lecture, KTH Royal Institute of Technology, Stockholm, Sweden, June 2015.
- G. Chattopadhyay, "Terahertz Radar for Stand-Off Through-Clothes Imaging," IEEE Distinguished Lecture, VTT Technical Research Centre of Finland, Helsinki, Finland, June 2015.
- G. Chattopadhyay, "Silicon Micromachined Compact Terahertz Instruments for Outer Planets," Invited Lecture at the Ecole Polytechnique, Montreal, Canada, May 2015.
- G. Chattopadhyay, "Terahertz Technology and Its Applications," IEEE Distinguished Lecture, IEEE Mumbai Chapter, Mumbai, India, May 2015.
- G. Chattopadhyay, "Terahertz Radar for Stand-Off Through-Clothes Imaging," IEEE Distinguished Lecture, Pennsylvania State University, State College, PA, USA, April 2015.
- G. Chattopadhyay, "Terahertz Technology and Its Applications," IEEE Distinguished Lecture, University of Central Florida, Orlando, FL, USA, March 2015.
- G. Chattopadhyay, "Terahertz Radar for Stand-Off Through-Clothes Imaging," IEEE Distinguished Lecture, Universidad Carlos III de Madrid, Madrid, Spain, March 2015.
- G. Chattopadhyay, "Terahertz Technology and Its Applications," IEEE Distinguished Lecture, Universidad Politécnica de Madrid, Madrid, Spain March 2015.

List of Publications

Book Chapter

[1] Book Title: Aperture Antennas for Millimeter and Submillimeter-Wave Applications, Ed. A. Boriskin and R. Sauleau

Chapter: Terahertz Antennas and Feeds

Authors: ***Goutam Chattopadhyay***, Maria Alonso-delPino, Nacer Chahat, David González-Ovejero, Choonsup Lee, and Theodore Reck.

Publisher: Springer, 2017.

[2] Book Title: Developments in Antenna Analysis and Synthesis, Ed. R. Mittra

Chapter: Terahertz Systems and Antennas

Authors: Goutam Chattopadhyay, Theodore Reck, Nacer Chahat, David González-Ovejero, Cecile Jung-Kubiak, Maria Alonso-delPino, and Choonsup Lee

Publisher: The Institution of Engineering and Technology (IET), 2017.

[3] Book Title: Handbook of Modern Reflector Antennas and Feed Systems for Space and Ground Applications, Vol. 3: Reflector Antenna Applications, Ed. S. Rao, L. Shafai, and S. Sharma

Chapter: Reflector Antennas for Terahertz Imaging

Authors: *G. Chattopadhyay*, N. Llombart, A. Neto, and A. Freni

Publisher: Artech House, 2013.

[4] Book Title: Smart Sensors and Sensing Technology.

Chapter: Submillimeter-Wave Coherent and Incoherent Sensors for Space Applications.

Author: *G. Chattopadhyay*.

Publisher: Springer, 2008.

Papers in Refereed Journals

Year 2017

[1] J. Kooi, T. Reck, R. A. Reeves, J. Kotz, A. K. Fung, L. A. Samoska, W. R. Deal, X. Mei, R. Lai, R. F. Jarnot, N. J. Livesey, and *G. Chattopadhyay*, "Submillimeter InP MMIC Low Noise Amplifier Gain Stability Characterization," *To appear in the IEEE Transactions on Terahertz Science and Technology,* July 2017.

[2] D. González-Ovejero, G. Minatti, ***G. Chattopadhyay***, S. Maci, "Multibeam by Metasurface Antennas," *To appear in the IEEE Transactions on Antennas and Propagation*, July 2017.

[3] ***G. Chattopadhyay***, T. Reck, C. Lee, and C. Jung-Kubiak, "Micromachined Packaging for Terahertz Systems," *Proceedings of the IEEE*, vol. 105, June 2017.

[4] M. Alonso-delPino, T. Reck, C. Jung-Kubiak, C. Lee, and ***G. Chattopadhyay***, "Development of Silicon Micromachined Microlens Antennas at 1.9 THz," IEEE *Transactions on Terahertz Science and Technology*, vol. 7, no. 2, pp. 328-335, March 2017.

Year 2016

[1] A. Tang, T. Reck, and G. Chattopadhyay, "CMOS System-on-Chip Techniques in Millimeter-Wave/THz Instruments and Communications for Planetary Explorations," *IEEE Communications Magazine*, vol. 54, no. 10, pp. 176-182, October 2016.

[2] C. Jung-Kubiak, T. Reck, J. V. Siles, R. Lin, C. Lee, J. Gill, K. Cooper, I. Mehdi, and G. Chattopadhyay, "A Multi-Step DRIE Process for Complex Terahertz Waveguide Components," *IEEE Transactions on Terahertz Science and Technology*, vol. 6, no. 5, pp. 690-695, September 2016.

[3] U. Shah, E. Decrossas, C. Jung-Kubiak, T. Reck, G. Chattopadhyay, I. Mehdi, and J. Oberhammer, "Submillimeter-Wave 3.3-bit RF MEMS Phase Shifter Integrated in Micromachined Waveguide," *IEEE Transactions on Terahertz Science and Technology*, vol. 6, no. 5, pp. 706-715, September 2016.

[4] T. Reck, C. Jung-Kubiak, and G. Chattopadhyay, "A 700 GHz MEMS Waveguide Switch," *IEEE Transactions on Terahertz Science and Technology*, vol. 6, no. 4, pp. 641-643, July 2016.

[5] T. Kiuru, ***G. Chattopadhyay***, T. Reck, A. J. Minnich, R. Line, E. Schlecht, J. Siles, C. Lee, and I. Mehdi, "Thermal Characterization of Substrate Options for High-Power THz Multipliers over a Broad Temperature Range," *IEEE Transactions on Terahertz Science and Technology*, vol. 6, no. 2, pp. 328-335, March 2016.

[6] T. Reck, A. Zemora, E. Schlecht, R. Dengler, W. Deal, and ***G. Chattopadhyay***, "A 230 GHz MMIC-Based Sideband Separating Receiver," *IEEE Transactions on Terahertz Science and Technology*, vol. 6, no. 1, pp. 141-147, January 2016.

Year 2015

[1] N. Chahat, T. Reck, C. Jung-Kubiak, T. Nguyen, R. Sauleau, and ***G. Chattopadhyay***, "1.9 THz Multi-Flare Angle Horn Optimization for Space Instruments," *IEEE Transactions on Terahertz Science and Technology*, vol. 5, no. 6, pp. 914-921, November 2015.

[2] P. A. R. Ade, ***G. Chattopadhyay***, et al., "Antenna-Coupled TES Bolometers used in BICEP2, Keck Array, and SPIDER," *Astrophysical Journal*, vol. 812, issue 2, October 2015.

[3] N. Chahat, A. Tang, C. Lee, R. Sauleau, and ***G. Chattopadhyay***, "Efficient CMOS Systems with Beam-Lead Interconnects for Space Instruments," *IEEE Transactions on Terahertz Science and Technology,* vol. 5, no. 4, pp. 637-644, July 2015.

[4] T. Reck, C. Jung-Kubiak, J. V. Siles, C. Lee, R. Lin, ***G. Chattopadhyay***, I. Mehdi, and K. Cooper, "A Silicon Micromachined Eight-Pixel Transceiver Array for Submillimeter-Wave Radar," *IEEE Transactions on Terahertz Science and Technology,* vol. 5, no. 2, pp. 197-206, March 2015.

[5] J. V. Siles, C. Lee, R. Lin, ***G. Chattopadhyay***, T. Reck, C. Jung-Kubiak, I. Mehdi, and K. Cooper, "A High-Power 105-120 GHz Broadband On-Chip Power-Combined Frequency Tripler," *IEEE Microwave and Wireless Components Letters*, vol. 25, no. 3, pp. 157-159, March 2015.

[6] M. Varonen, L. Samoska, A. Fung, S. Padmanabhan, P. Kangaslathi, R. Lai, S. Sarkozy, M. Soria, H. Owen, T. Reck, ***G. Chattopadhyay***, P. V. Larkoski, and T. Gaier, "A WR4 Amplifier Module Chain with an 87 K Noise Temperature at 228 GHz," *IEEE Microwave and Wireless Components Letters*, vol. 25, no. 1, pp. 58-60, January 2015.

Year 2014

[1] K. B. Cooper and ***G. Chattopadhyay***, "Submillimeter-Wave Radar," *IEEE Microwave Magazine*, pp. 51-67, November-December 2014.

[2] C. A. Leal-Sevillano, K. B. Cooper, E. Decrossas, R. J. Dengler, J. A. Ruiz-Cruz, J. R. Montejo-Garai, *G. Chattopadhyay*, and J. M. Rebollar, "Compact Duplexing for a 680-GHz Radar Using a Waveguide Orthomode Transducer," *IEEE Transactions on Microwave Theory and Techniques*, vol. 62, no. 11, pp. 2833-2842, November 2014.

[3] E. Schlecht, J. V. Siles, C. Lee, R. Lin, B. Thomas, *G. Chattopadhyay*, and I. Mehdi, "Schottky Diode Based 1.2 THz Receivers Operating at Room-Temperature and Below for Planetary Atmospheric Sounding," *IEEE Transactions on Terahertz Science and Technology*, vol. 4, no. 6, pp. 661-669, November 2014.

[4] C. A. Leal-Sevillano, T. Reck, *G. Chattopadhyay*, J. A. Ruiz-Cruz, J. R. Montejo-Garai, and J. M. Rebollar, "Development of a Wideband Compact Orthomode Transducer for the 180-270 GHz Band," *IEEE Transactions on Terahertz Science and Technology*, vol. 4, no. 5, pp. 634-636, September 2014.

[5] E. Shirokoff, P. S. Barry, C. M. Bradford, *G. Chattopadhyay*, P. Day, S. Doyle, S. Hailey-Dunsheath, M. I. Hollister, A. Kovács, H. G. Leduc, C. M. McKenney, P. Mauskopf, H. T. Nguyen, R. O'Brient, S. Padin, T. J. Reck, L. J. Swenson, C. E. Tucker, and J. Zmuidzinas, "Design and Performance of SuperSpec: An On-Chip, KID-Based, mm-Wavelength Spectrometer," *J. Low Temp. Phys*., DOI 10.1007/s10909-014-1122-8, Springer, February 2014.

[6] S. Hailey-Dunsheath, P. S. Barry, C. M. Bradford, *G. Chattopadhyay*, P. Day, S. Doyle, M. I. Hollister, A. Kovács, H. G. Leduc, C. M. McKenney, P. Mauskopf, H. T. Nguyen, R. O'Brient, S. Padin, T. J. Reck, E. Shirokoff, L. J. Swenson, C. E. Tucker, and J. Zmuidzinas, "Optical Measurements of SuperSpec: A Millimeter-Wave On-Chip Spectrometer," *J. Low Temp. Phys*., DOI 10.1007/s10909-013-1068-2, Springer, February 2014.

[7] T. Reck, C. Jung-Kubiak, and *G. Chattopadhyay*, "Measurement of Silicon Micromachined Waveguide Components at 500 to 750 GHz," *IEEE Transactions on Terahertz Science and Technology*, vol. 4, no. 1, pp. 33-38, January 2014.

Year 2013

[1] T. Reck and *G. Chattopadhyay*, "A 600 GHz Asymmetrical Orthogonal Mode Transducer," *IEEE Microwave and Wireless Components Letters,* vol. 23, no. 11, pp. 569-571, November 2013.

[2] N. Llombart, C. Lee, M. Alonso, *G. Chattopadhyay*, C. Jung-Kubiak, L. Jofre, and I. Mehdi, "Silicon Micromachined Lens Antenna for Terahertz Integrated Heterodyne Arrays," *IEEE Transactions on Terahertz Science and Technology*, vol. 3, no. 5, pp. 515-523, September 2013.

[3] C. A. Leal-Sevillano, T. Reck, C. Jung-Kubiak, *G. Chattopadhyay*, J. A. Ruiz-Cruz, J. R. Montejo-Garai, and J. M. Rebollar, "Silicon Micromachined Canonical E-Plane and H-Plane Bandpass Filters at the Terahertz Band," *IEEE Microwave and Wireless Components Letters*, vol. 23, no. 6, pp. 288-290, June 2013.

[4] M. Alonso, N. Llombart, *G. Chattopadhyay*, C. Lee, C. Jung-Kubiak, L. Jofre, and I. Mehdi, "Design Guidelines for a Terahertz Silicon Micro-Lens Antenna," *IEEE Antennas and Propagations Letters*, AWPL-11-12-1440, March 2013.

Year 2012

[1] A. Y. Tang, E. Schlecht, R. Lin, *G. Chattopadhyay*, C. Lee, J. Gill, I. Mehdi, and J. Stake, "Electro-Thermal Model for Multi-Anode Schottky Diode Multipliers," *IEEE Transactions on Terahertz Science and Technology,* vol. 2, no. 3, pp. 290-298, May 2012.

[2] K. B. Cooper, N. Llombart, *G. Chattopadhyay*, R. Dengler, R. E. Cofield, C. Lee, S. Filchenkov, and E. Koposova, "A Grating-Based Circular Polarization Duplexer for Submillimeter-Wave Transceivers," *IEEE Microwave and Wireless Components Letters*, vol. 22, no. 3, pp. 108-110, March 2012.

[3] A. Maestrini, I. Mehdi, J. Siles, J. S. Ward, R. Lin, B. Thomas, C. Lee, J. Gill, *G. Chattopadhyay*, E. Schlecht, J. Pearson, and P. H. Siegel, "Design and Characterization of a Room Temperature All-Solid-State Electronic Source Tunable from 2.48 to 2.75 THz," *IEEE Transactions on Terahertz Science and Technology*, vol. 2, no. 2, pp. 177-185, March 2012.

Year 2011

[1] *G. Chattopadhyay,* "Technology, Capabilities, and Performance of Low Power Terahertz Sources," *IEEE Transactions on Terahertz Science and Technology,* vol. 1, no. 1, pp. 33-53, September 2011.

[2] K. B. Cooper, R. J. Dengler, N. Llombart, B. Thomas, *G. Chattopadhyay*, and P. H. Siegel, "THz Imaging Radar for Standoff Personnel Screening," *IEEE Transactions on Terahertz Science and Technology,* vol. 1, no. 1, pp. 169-182, September 2011.

[3] J. C. Pearson, B. J. Drouin, A. Maestrini, I. Mehdi, J. Ward, R. H. Lin, Shanshan Yu, J. J. Gill, B. Thomas, C. Lee, *G. Chattopadhyay*, E. Schlecht, F. Maiwald, P. F. Goldsmith, and P. H. Siegel, "Demonstration of a Room Temperature 2.48-2.75 THz Coherent Spectroscopy Source," *Review of Scientific Instruments*, vol. 82, no. 9, September 2011.

[4] N. Llombart, *G. Chattopadhyay*, A. Skalare, and I. Mehdi, "Novel Terahertz Antenna Based on a Silicon Lens Fed by a Leaky Wave Enhanced Waveguide," *IEEE Transactions on Antennas and Propagation,* vol. 59, no. 6, pp. 2160-2168, June 2011.

Year 2010-1995

[1] *G. Chattopadhyay*, J. S. Ward, N. Llombart, and K. B. Cooper, "Submillimeter-Wave 90° Polarizations Twists for Integrated Waveguide Circuits," *IEEE Microwave and Wireless Components Letters,* vol. 20, no. 11, pp. 592-594, November 2010.

[2] S. –L, Quin, P. Schilke, ..., and *G. Chattopadhyay*, "Herschel Observations of EXtra-Ordinary Sources (HEXOS): Detecting Spiral Arm Clouds by CH Absorption Lines," *Astronomy & Astrophysics*, vol. 521, no. L14, October 2010.

[3] R. Rolffs, P. Schilke, C. Comito, …., and *G. Chattopadhyay*, "Reversal of infall in SgrB2(M) revealed by Herschel/HIFI observations of HCN lines at THz frequencies," *Astronomy & Astrophysics*, vol. 521, no. L46, October 2010.

[4] H. Gupta, P. Rimmer, J. C. Pearson, …, and *G. Chattopadhyay*, "Detection of OH^+ and H_2O^+ towards Orion KL," *Astronomy & Astrophysics*, vol. 521, no. L47, October 2010.

[5] A. Maestrini, B. Thomas, H. Wang, C. Jung, J. Treuttel, Y. Gin, *G. Chattopadhyay*, I. Mehdi, and G. Beaudin, "Schottky Diode-Based Terahertz Frequency Multipliers and Mixers," *Comptes Rendus Physique*, vol. 11, no. 7-8, pp. 480-495, August 2010.

[6] T. De Graauw, F. P. Helmich, T. Phillips, J. Stutzki, .., *G. Chattopadhyay*, *et al*., "The Herschel-Heterodyne Instrument for the Far-Infrared (HIFI)," *Astronomy and Astrophysics*, vol. 518, no. L6, August 2010.

[7] N. Llombert, K. B. Cooper, R. J. Dengler, T. Bryllert, *G. Chattopadhyay*, and P. H. Siegel, "Time Delay Multiplexing of Two Beams in a THz Imaging Radar," *IEEE Transactions on Microwave Theory and Techniques*, vol. 58, no. 7, pp. 1999-2007, July 2010.

[8] A. Maestrini, J. S. Ward, J. J. Gill, C. Lee, B. Thomas, R. H. Lin, *G. Chattopadhyay*, and I. Mehdi, "A Frequency-Multiplied Source with more Than 1 mW of Power across the 840-900 GHz Band," *IEEE Transactions on Microwave Theory and Techniques,* vol. 58, no. 7, pp. 1925-1932, July 2010.

[9] K. B. Cooper, R. J. Dengler, N. Llombert, T. Bryllert, *G. Chattopadhyay*, I. Mehdi, and P. H. Siegel, "An Approach for Sub-Second Imaging of Concealed Weapons using Terahertz (THz) Radar," *International Journal on Infrared and Millimeter-Waves,* vol. 30, no. 12, pp. 1297-1307, December 2009.

[10] K. B. Cooper, R. J. Dengler, N. Llombert, T. Bryllert, *G. Chattopadhyay*, E. Schlecht, J. Gill, C. Lee, A. Skalare, I. Mehdi, and P. H. Siegel, "Penetrating 3D Imaging at 4 and 25 Meter Range Using a Submillimeter-Wave Radar," *IEEE Transactions on Microwave Theory and Techniques*, vol. 56, no. 12, pp. 2771-2778, December 2008.

[11] L. Samoska, W. R. Deal, *G. Chattopadhyay*, D. Pukala, A. Fung, T. Gaier, M. Soria, V. Radisic, X. Mei, and R. Lai, "A Submillimeter-Wave HEMT Amplifier Module with Integrated Waveguide Transitions Operating Above 300 GHz," *IEEE Transactions on Microwave Theory and Techniques*, vol. 56, no. 6, pp. 1380-1388, June 2008.

[13] A. Maestrini, J. Ward, *G. Chattopadhyay*, E. Schlecht, and I. Mehdi, "Terahertz Sources Based on Frequency Multiplication and Their Applications," *Frequenz – Journal of RF-Engineering and Telecommunications*, vol. 62, no. 5-6, pp. 118-121, May-June 2008.

[14] A. Fung, L. Samoska, *G. Chattopadhyay*, T. Gaier, P. Kangaslathi, D. Pukala, C. Olsen, A. Denning, and Y. Lau, "Two Port Vector Network Analyzer Measurement Up to 508 GHz," *IEEE Transactions on Instrumentation and Measurement*, vol. 57, no. 6, pp. 1166-1170, June 2008.

[15] W. D. Duncan, R. E. Schwall, K. D. Irwin, J. A. Beall, C. D. Reintsema, W. Doriese, H. -M. Cho, B. Estey, *G. Chattopadhyay*, P. Ade, and C. Tucker, "An Optical System for Body Imaging from a Distance," *Journal of Low Temperature Physics,* vol. 151, no. 3/4, pp. 777-783, May 2008.

[16] *G. Chattopadhyay*, "Sensor Technology at Submillimeter Wavelengths for Space Applications," *International Journal on Smart Sensing and Intelligent Systems*, vol. 1, no. 1, pp. 1-20, March 2008.

[17] A. Maestrini, J. S. Ward, C. Tripon-Canseliet, J. J. Gill, C. Lee, H. Javadi, *G. Chattopadhyay*, and I. Mehdi, "In-Phase Power-Combined Frequency Triplers at 300 GHz," *IEEE Microwave and Wireless Components Letters*, vol. 18, no. 3 , pp. 218-220, March 2008.

[18] K. B. Cooper, R. J. Dengler, *G. Chattopadhyay*, E. Schlecht, J. Gill, A. Skalare, I. Mehdi, and P. H. Siegel, "A High-Resolution Imaging Radar at 580 GHz," *IEEE Microwave and Wireless Components Letters*, , vol. 18, no. 1, pp. 64-66, January 2008.

[19] J. W. Kooi, A.Kovacs, M. C. Sumners, *G. Chattopadhyay*, R. Ceria, D. Miller, B. Bumble, R. LeDuc, J. Stern, and T. G. Phillips, "A Wide IF Bandwidth 275-425 GHz Tunerless Waveguide Receiver Based on AlN SIS Technology," *IEEE Transactions on Microwave Theory and Techniques*, vol. 55, no. 10, pp. 2086-2096, October 2007.

[20] A. Maestrini, J. S. Ward, H. Javadi, C. Tripon-Canseliet, J. Gill, *G. Chattopadhyay*, E. Schlecht, and I. Mehdi, "Local Oscillator Chain for 1.55 to 1.75 THz with 100 uW Peak Power," *IEEE Microwave and Wireless Components Letters*, vol. 15, no. 12, pp. 871-873, December 2005.

[21] A. Maestrini, J. S. Ward, J. J. Gill, H. S. Javadi, E. Schlecht, C. Tripon-Canseliet, *G. Chattopadhyay*, and I. Mehdi, "A 540-640 GHz High Efficiency Four Anode Frequency Tripler," *IEEE Transactions on Microwave Theory and Techniques*, vol. 53, no. 9, pp. 2835-2843, September 2005.

[22] A. Maestrini, J. Ward, J. Gill, H. Javadi, E. Schlecht, *G. Chattopadhyay*, F. Maiwald, N. R. Erickson, and I. Mehdi, "A 1.7 to 1.9 THz Local Oscillator Source," *IEEE Microwave and Wireless Components Letters*, vol. 14, no. 6, pp. 253-255, June 2004.

[23] *G. Chattopadhyay*, E. Schlecht, J. Ward, J. Gill, H. Javadi, F. Maiwald, and I. Mehdi, "An All Solid-State Broadband Frequency Multiplier Chain at 1500 GHz," *IEEE Transactions on Microwave Theory and Techniques*, vol. 52, no. 5, pp. 1538-1547, May 2004.

[24] *G. Chattopadhyay*, J. Glenn, J. J. Bock, B. Rownd, M. Caldwell, and M. J. Griffin, "Feed Horn Coupled Bolometer Arrays for SPIRE - Design, Simulations, and Measurements," *IEEE Transactions on Microwave Theory and Techniques*, vol. 51, no. 10, pp. 2139-2146, October 2003.

[25] *G. Chattopadhyay*, F. Maiwald, E. Schlecht, R. J. Dengler, J. C. Pearson, and I. Mehdi, "Spurious Signal Response of Broadband Solid-State Frequency Multipliers at Millimeter and Submillimeter Wavelengths," *International Journal of Infrared and Millimeter Waves*, vol. 24, no. 9, pp. 1485-1498, September 2003.

[26] J. W. Kooi, *G. Chattopadhyay*, S. Withington, F. Rice, J. Zmuidzinas, and G. Yassin, "A Full-Height Waveguide to Thin-Film Microstrip Transition with Exceptional RF Bandwidth and Coupling Efficiency," *International Journal of Infrared and Millimeter Waves*, vol. 24, no. 3, pp. 261-284, March 2003.

[27] *G. Chattopadhyay*, E. Schlecht, J. Gill, S. Martin, A. Maestrini, D. Pukala, F. Maiwald, and I. Mehdi, "A Broadband 800 GHz Schottky Balanced Doubler," *IEEE Microwave and Wireless Components Letters*, vol.12, no.4, pp.117-118, April 2002.

[28] J. Glenn, *G. Chattopadhyay*, S. F. Edgington, A. E. Lange, J. J. Bock, P. M. Mauskopf, and A. T. Lee, "Numerical Optimization of Integrating Cavities for Diffraction Limited Millimeter-Wave Bolometer Arrays," *Applied Optics*, vol.41, no.1/1, pp. 136-142, January 2002.

[29] *G. Chattopadhyay*, D. Miller, H. G. LeDuc, and J. Zmuidzinas, "A Dual-Polarized Quasi-Optical SIS Mixer at 550 GHz," *IEEE Transactions on Microwave Theory and Techniques*, vol.48, no.10, pp.1680-1686, October 2000.

[30] J. W. Kooi, J. Kawamura, J. Chen, *G. Chattopadhyay*, J. R. Pardo, J. Zmuidzinas, T. G. Phillips, B. Bumble, J. Stern, and H. G. LeDuc, "A Low Noise NbTiN-based 850 GHz SIS Receiver for the Caltech Submillimeter Observatory," *International Journal of Infrared and Millimeter Waves,* vol.21, no.9, pp. 1357-1373, September 2000.

[31] J. W. Kooi, *G. Chattopadhyay*, M. Thielman, T. G. Phillips, and R. Schieder, "Noise Stability of SIS Receivers," *International Journal of Infrared and Millimeter Waves*, vol.21, no.5, pp. 689-716, May 2000.

[32] *G. Chattopadhyay*, F. Rice, D. Miller, H. G. LeDuc, and J. Zmuidzinas, "A 530-GHz Balanced Mixer," *IEEE Microwave and Guided Wave Letters* , vol.9, no.11, pp. 467-469, November 1999.

[33] *G. Chattopadhyay*, and J. E. Carlstrom, "Finline Ortho-Mode Transducer for Millimeter Waves," *IEEE Microwave and Guided Wave Letters*, vol.9, no.9, pp. 339-341, September 1999.

[34] *G. Chattopadhyay*, B. Philhour, S. Church, J. E. Carlstrom, A. E. Lange, and J. Zmuidzinas, "A 96 GHz Ortho-Mode Transducer for the Polatron," *IEEE Microwave and Guided Wave Letters*, vol.8, no.12, pp. 421-423, December 1998.

[35] *G. Chattopadhyay* and J. Zmuidzinas, "A Dual-Polarized Slot Antenna for Millimeter Waves," *IEEE Transactions on Antennas and Propagation*, vol.46, no.5, pp. 736-737, May 1998.

[36] J. W. Kooi, J. A. Stern, *G. Chattopadhyay*, H. LeDuc, B. Bumble, and J. Zmuidzinas, "Low-Loss NbTiN films for THz SIS mixer tuning circuits," *International Journal of Infrared and Millimeter Waves*, vol.19, no.3, pp. 373-383, March 1998.

[37] T. L. Venkatasubramani, B. Ajithkumar, R. Somasekhar, K. S. Saini, and *G. Chattopadhyay*, "Local Oscillator, IF-System, and Baseband System for GMRT," *Journal of Astrophysics and Astronomy*, vol. 16, no. Suppl., pp. 451, 1995.

Papers in Conference Proceedings

Year 2017

[1] *G. Chattopadhyay*, "Terahertz Science, Technology, and Applications" *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Paris, France, April 2016.

GOUTAM CHATTOPADHYAY

[2] *G. Chattopadhyay*, T. Reck, C. Jung-Kubiak, M. Alonso-delPino, and C. Lee, "Interconnect and Packaging Technologies for Terahertz Communication Systems," *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Paris, France, April 2016.

[3] C. Jung-Kubiak, L. Sayers, M. Hollister, A. Bose, H. Yoshida, L. Luke, J. Wong, S. Radford, *G. Chattopadhyay*, and S. Golwala, "Antireflective Textured Silicon Optics at Millimeter and Submillimeter Wavelengths," *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Paris, France, April 2016.

[4] D. Gonzalez-Ovejero, G. Minatti, E. Martini, *G. Chattopadhyay*, and S. Maci, "Shared Aperture Metasurface Antennas for Multibeam Patterns," *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Paris, France, April 2016.

[5] D. Gonzalez-Ovejero, C. Jung-Kubiak, M. Alonso-delPino, T. Reck, and *G. Chattopadhyay*, "Design, Fabrication and Testing of a Modulated Metasurface Antenna at 300 GHz," *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Paris, France, April 2016.

[6] *G. Chattopadhyay*, M. Alonso-delPino, T. Reck, C. Jung-Kubiak, and C. Lee, "Silicon Micromachined Integrated 4-Pixel Heterodyne Receiver at 1.9 THz," *Proc. 28th International Symposium on Space Terahertz Technology*, Cologne, Germany, March 2017.

[6 *G. Chattopadhyay*, "Terahertz Conformal Antennas and Packaging," *Proc. International Workshop on Antenna Technology (iWAT)*, Athens, Greece, March 2017.

[8] *G. Chattopadhyay*, "Planar High Performance Antennas at Terahertz Frequencies," *URSI United States National Radio Science Meeting*, Boulder, CO, USA January 2017.

Year 2016

[1] *G. Chattopadhyay*, T. Reck, C. Jung-Kubiak, D. Gonzalez-Ovejero, A. Tang, C. Lee, and M. Alonso-delPino, "A Low-Power Low-Mass Dual-Polarization Sensitive Submillimeter-Wave Radiometer/Spectrometer," *Proc. 3rd International Workshop on Instrumentation for Planetary Missions*, Pasadena, CA, USA, October 2016.

[2] K. B. Cooper, C. Baldi, *G. Chattopadhyay*, M. Choukroun, C. Cochrane, R. Dengler, S. Durden, T. O. El Bouayadi, D. Gonzalez-Ovejero, R. Monje, A. Skalare, A. Tang, and S. Tanelli, "A Combination Millimeter-Wave Doppler Radar and THz Spectrometer for Planetary Science," *European Microwave Week*, London, UK, October 2016.

[3] *G. Chattopadhyay*, T. Reck, C. Jung-Kubiak, D. Gonzalez-Ovejero, A. Tang, C. Lee, and M. Alonso-delPino, "Silicon Micromachined Terahertz Spectrometer Instruments," *Proc. 41st International Conference on Infrared, Millimeter, and THz Waves*, Copenhagen, Denmark, September 2016.

[4] T. Reck, E. Schlecht, W. Deal, and *G. Chattopadhyay*, "A 640 GHz MMIC-based Sideband-Separating Receiver for Atmospheric Science," *Proc. 41st International Conference on Infrared, Millimeter, and THz Waves*, Copenhagen, Denmark, September 2016.

[5] C. Jung-Kubiak, T. Reck, M. Alonso-delPino, and *G. Chattopadhyay*, "Silicon Micromachined Components at 1 THz and Beyond," *Proc. 41st International Conference on Infrared, Millimeter, and THz Waves*, Copenhagen, Denmark, September 2016.

[6] H. Mani, C. Groppi, P. Mauskopf, T. Reck, and *G. Chattopadhyay*, "Ultra Wideband Room Temperature and Cryogenic LNAs with Low Power Consumption for Radio Astronomy Instrumentation," *SPIE Astronomical Telescope and Instrumentation, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy (9914)*, Edinburgh, UK, July 2016.

[7] M. Hollister, C. Jung-Kubiak, *G. Chattopadhyay*, *et. al*., "Antireflection and gradient index layers for silicon optical elements utilizing deep reactive ion etch processing," *SPIE Astronomical Telescope and Instrumentation, Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy (9914)*, Edinburgh, UK, July 2016.

[8] D. Gonzalez-Ovejero, T. Reck, C. Jung-Kubiak, M. Alonso-delPino, and *G. Chattopadhyay*, "A Class of Silicon Micromachined Metasurface for the Design of High-Gain Terahertz Antennas," *Proc. IEEE International Symposium on Antennas and Propagation*, Puerto Rico, USA, July 2016.

[9] A. Tang, T. Reck, Y. Kim, G. Virbila, *G. Chattopadhyay*, and M.-C. Frank Chang, "A 65nm CMOS 88-105 GHz DDFS-Based Fractional Synthesizer for High Resolution Planetary Exploration Spectroscopy," *IEEE MTT-S International Microwave Symposium Digest*, San Francisco, CA, USA, May 2016.

[10] *G. Chattopadhyay*, "Terahertz Radar for Imaging Applications," *21st International Conference on Microwaves, Radar and Wireless Communications*, Krakow, Poland, May 2016.

[11] D. Gonzalez-Ovejero, T. Reck, C. Jung-Kubiak, M. Alonso-delPino, and *G. Chattopadhyay*, "Silicon Micromachined Modulated Metasurface Antennas in the Terahertz Range," *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Davos, Switzerland, April 2016.

[12] M. Alonso-delPino, T. Reck, C. Lee, C. Jung-Kubiak, N. Llbomart, I. Mehdi, and *G. Chattopadhyay*, "Micro-Lens Antenna Integrated in a Silicon Micromachined Receiver at 1.9 THz," *Proc. 10th European Conference on Antennas and Propagation (EuCAP)*, Davos, Switzerland, April 2016.

[13] *G. Chattopadhyay*, "Antennas for Millimeter-Waves and Terahertz Applications," *Proc. International Workshop on Antenna Technology (iWAT)*, Cocoa Beach, Florida, USA, March 2016.

[14] *G. Chattopadhyay*, "Design, Fabrication, and Performance of Terahertz Antennas," *URSI United States National Radio Science Meeting*, Boulder, CO, USA January 2016.

Year 2015

[1] J. Siles, C. Jung-Kubiak, T. Reck, C. Lee, R. Lin, *G. Chattopadhyay*, and I. Mehdi, "A Dual-Output 550 GHz Frequency Tripler featuring Ultra-Compact Silicon Micromachining Packaging and Enhanced Power-Handling Capabilities," *Proc. European Microwave Conference*, Paris, France, September 2015.

[2] *G. Chattopadhyay*, T. Reck, E. Schlecht, W. Deal, and I. Mehdi, "Cryogenic Amplifier Based Sideband Separating Receivers," *Proc. 40th International Conference on Infrared, Millimeter, and THz Waves*, Hong Kong, August 2015.

[3] *G. Chattopadhyay*, T. Reck, N. Chahat, C. Lee, C. Jung-Kubiak, B. Karasik, M. Alonso-delPino, and N. Llombart, "Terahertz Antennas and Optical Elements," *Proc. IEEE International Symposium on Antennas and Propagation*, Vancouver, Canada, July 2015.

[4] D. Gonzalez-Ovejero, *G. Chattopadhyay*, and S. Maci, "Efficient Analysis of Metasurfaces in a Planar Layered Medium," *Proc. IEEE International Symposium on Antennas and Propagation*, Vancouver, Canada, July 2015.

[5] *G. Chattopadhyay*, T. Reck, E. Schlecht, W. Deal, J. Kooi, P. Stek, and N. Livesey, "Submillimeter-Wave Sounders with Cryogenic Amplifier Based Receiver Front-End," *Proc. NASA Earth Science Technology Forum (ESTF)*, Pasadena, CA, USA, June 2015.

[6] A. Tang, F. Hsiao, Y. Kim, L. Du, L. Kong, G. Virbila, Y-C. Kuan, C. Lee, *G. Chattopadhyay*, N. Chahat, T. Reck, M. C. Chang, and I. Mehdi, "A 95 GHz Centimeter Scale Precision Confined Pathway System-on-Chip Navigation Processor for Autonomous Vehicles in 65nm CMOS," *IEEE MTT-S International Microwave Symposium Digest*, Phoenix, AZ, USA, May 2015.

[7] Z. Chen, A. Tang, Y. Kim, G. Virbila, T. Reck, *G. Chattopadhyay*, and M. C. Chang, "A Wide-band 65nm CMOS 28-34 GHz Synthesizer Module Enabling Low Power Heterodyne Spectrometers for Planetary Exploration," *IEEE MTT-S International Microwave Symposium Digest*, Phoenix, AZ, USA, May 2015.

[8] U. Shah, E. Decrossas, C. Jung-Kubiak, T. Reck, *G. Chattopadhyay*, I. Mehdi, and J. Oberhammer, "500-600 GHz RF MEMS Based Tunable Stub Integrated in Micromachined Rectangular Waveguide," *IEEE MTT-S International Microwave Symposium Digest*, Phoenix, AZ, USA, May 2015.

[9] U. Shah, E. Decrossas, C. Jung-Kubiak, T. Reck, *G. Chattopadhyay*, I. Mehdi, and J. Oberhammer, "500-600 GHz Submillimeter-Wave 3.3 bit RF MEMS Phase Shifter Integrated in Micromachined Waveguide," *IEEE MTT-S International Microwave Symposium Digest*, Phoenix, AZ, USA, May 2015.

[10] *G. Chattopadhyay*, T. Reck, A. Tang, C. Jung-Kubiak, C. Lee, J. Siles, E. Schlecht, Y. M. Kim, M-C F. Chang, and I. Mehdi, "Compact Terahertz Instruments for Planetary Missions," *Proc. 9th European Conference on Antennas and Propagation (EuCAP)*, Lisbon, Portugal, April 2015.

[11] T. Reck, E. Schlecht, R. Dengler, W. Deal, and *G. Chattopadhyay*, "A 230 GHz MMIC-Based Sideband Separating Receiver," *Proc. 26th International Symposium on Space Terahertz Technology*, Boston, MA, March 2015.

12] *G. Chattopadhyay*, "Terahertz Antennas and Related Optical Components," *Proc. International Workshop on Antenna Technology (iWAT)*, Seoul, Korea, March 2015.

[13] C. Lee, *G. Chattopadhyay*, E. Decrossas, A. Peralta, I. Mehdi, C. A. Leal-Sevillano, M. Alonso-delPino, and N. Llombart, "Terahertz Antenna Arrays with Silicon Micromachined-Based Microlens Antenna and Corrugated Horns," *Proc. International Workshop on Antenna Technology (iWAT)*, Seoul, Korea, March 2015.

GOUTAM CHATTOPADHYAY

Year 2014

[1] *G. Chattopadhyay*, T. Reck, A. Tang, C. Jung-Kubiak, C. Lee, J. Siles, E. Schlecht, M-C F. Chang, and I. Mehdi, "Silicon Micromachined High-Resolution Terahertz Spectroscopic Instrument for Planetary Missions," *NASA International Workshop on Instrumentation for Planetary Missions*, Greenbelt, MD, USA, November 2014.

[2] *G. Chattopadhyay*, T. Reck, E. Schlecht, W. Deal, R. Lin, P. Stek, and I. Mehdi, "Cryogenic Amplifier Based Receivers for Submillimeter-Wave Sounders," *Proc. NASA Earth Science Technology Forum (ESTF)*, Leesburg, VA, USA, October 2014.

[3] *G. Chattopadhyay*, "Terahertz Circuits, Systems, and Imaging Instruments," *Proc. 39th International Conference on Infrared, Millimeter, and THz Waves*, Tucson, AZ, USA, September 2014.

[4] T. Reck, C. Jung-Kubiak, C. Leal-Sevillano, and *G. Chattopadhyay*, "Silicon Micromachined Waveguide Components at 0.75 to 1.1 THz," *Proc. 39th International Conference on Infrared, Millimeter, and THz Waves*, Tucson, AZ, USA, Sept. 2014.

[5] N. Llombart, M. Alonso-delPino, C. Lee, *G. Chattopadhyay*, C. Jung-Kubiak, and I. Mehdi, "On the Development of Silicon Micromachined Lens Antennas for THz Integrated Heterodyne Arrays," *Proc. 39th International Conference on Infrared, Millimeter, and THz Waves*, Tucson, AZ, USA, September 2014.

[6] C. Lee, *G. Chattopadhyay*, M. Alonso-delPino, and N. Llombart, "6.4 mm Diameter Silicon Micromachined Lens for THz Dielectric Antenna," *Proc. 39th International Conference on Infrared, Millimeter, and THz Waves*, Tucson, AZ, USA, September 2014.

[7] C. Jung-Kubiak, T. Reck, and *G. Chattopadhyay*, "Integrated Calibration Switches for Compact Planetary Instruments," *Proc. 39th International Conference on Infrared, Millimeter, and THz Waves*, Tucson, AZ, USA, September 2014.

[8] A. Zamora, K. M. K. H. Leong, T. Reck, *G. Chattopadhyay*, and W. Deal, "A 170-280 GHz InP HEMT Low Noise Amplifier," *Proc. 39th International Conference on Infrared, Millimeter, and THz Waves*, Tucson, AZ, USA, September 2014.

[9] A. Tang, M-C. Frank Chang, *G. Chattopadhyay*, Z. Chen, T. Reck, H. Schone, Y. Zhao, L. Du, D. Murphy, N. Chahat, E. Decrossas and I. Mehdi, "Applications of CMOS (Sub)-mm-Wave System-on-Chip for Exploration of Deep Space and Outer Planetary Systems," *IEEE Custom Integrated Circuit Conference (CICC)*, San Jose, CA, USA, September 2014.

[10] *G. Chattopadhyay*, "Interconnects and Packaging of Terahertz Waveguide Components for Multi-Pixel Arrays," *IEEE MTT-S International Microwave Symposium Digest*, Tampa, FL, USA, June 2014.

[11] A. Tang, N. Chahat, Y. Zhao, G. Virbila, C. Lee, F. Hsiao, L. Du, Y. C. Kuan, M-C F. Chang, *G. Chattopadhyay*, and I. Mehdi, "A 65nm CMOS 140 GHz 27.3 dBm EIRP Transmit Array with Membrane Antenna for Highly Scalable Multi-Chip Phase Arrays," *IEEE MTT-S International Microwave Symposium Digest*, Tampa, FL, USA, June 2014.

[12] T. Reck, W. Deal, and *G. Chattopadhyay*, "Cryogenic Performance of HEMT Amplifiers at 340 GHz and 670 GHz," *IEEE MTT-S International Microwave Symposium Digest*, Tampa, FL, USA, June 2014.

[13] *G. Chattopadhyay*, T. Reck, E. Schlecht, A. Fung, L. Samoska, W. Deal, P. Stek, and I. Mehdi, "Submillimeter-Wave Radiometer and Spectrometers using Cryogenically Cooled HEMT Amplifier Front-Ends," *Proc. 25th International Symposium on Space Terahertz Technology*, Moscow, Russia, April 2014.

[14] J. V. Siles, C. Lee, R. Lin, *G. Chattopadhyay*, and I. Mehdi, "Progress towards a Room-Temperature 4.7 THz Multiplied Local Oscillator Source to Enable Neutral Oxygen Observation," *Proc. 25th International Symposium on Space Terahertz Technology*, Moscow, Russia, April 2014.

[15] *G. Chattopadhyay*, T. Reck, C. Jung-Kubiak, C. Lee, J. V. Siles, N. Chahat, K. Cooper, E. Schlecht, M. Alonso-del Pino, and I. Mehdi, "Terahertz Antennas with Silicon Micromachined Front-End," *Proc. 8th European Conference on Antennas and Propagation (EuCAP),* Hague, Netherlands, April 2014.

[16] *G. Chattopadhyay*, T. Reck, L. Samoska, A. Fung, W. Deal, and P. Stek, "Cryogenic Amplifier Based Receiver Front-Ends for Submillimeter-Wave Radiometer and Spectrometers," *Proc. 13th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRad)*, Pasadena, CA, USA, March 2014.

[17] *G. Chattopadhyay*, "Silicon Micromachined Terahertz Receiver Systems," *Proc. International Workshop on Antenna Technology (iWAT)*, Sydney, Australia, March 2014.

[18] A. Tang, Y. Zhao, G. Virbila, N. Chahat, C. Lee, F. Hsiao, Li Du, R. Shin, Y-C Kuan, M-C. F. Chang, *G. Chattopadhyay*, and I. Mehdi, "A 140 GHz 27.3 dBm EIRP Transmitter Array with Membrane Antenna Using Distributed Local Synchronization PLL (LS-PLL) for Highly Scalable Multi-Chip Phase Arrays," *Proc. International Solid-State Circuits Conference (ISSCC)*, San Francisco, CA, USA, February 2014.

[19] *G. Chattopadhyay*, "Components and Systems for Terahertz Applications," *Proc. USNC-URSI National Radio Science Meeting*, Boulder, CO, USA, January 2014.

[20] I. Mehdi, J. V. Siles, J. Kawamuar, P. Goldsmith, C. Lee, ***G. Chattopadhyay***, B. Bumble, and J. Stern, "Next Generation Submillimeter Heterodyne Focal Plane Array Technology," *Proc. American Astronomical Society 223rd Meeting*, Washington DC, USA, January 2014.

Year 2013

[1] ***G. Chattopadhyay***, T. Reck, C. Jung-Kubiak, J. Siles, C. Lee, R. Lin, and I. Mehdi, "Silicon Micromachining for Terahertz Component Development," IEEE International Microwave and RF Conference, New Delhi, December 2013.

[2] ***G. Chattopadhyay***, "Technologies for Terahertz Science," *IEEE MTT-S International Microwave Symposium Digest*, Seattle, Washington, June 2013.

[2] T. Reck, ***G. Chattopadhyay***, and W. R. Deal, "A Tandem Coupler for Terahertz Integrated Circuits," *IEEE MTT-S International Microwave Symposium Digest*, Seattle, Washington, June 2013.

[3] ***G. Chattopadhyay***, T. Reck, E. Schlecht, W. R. Deal, A. Fung, L. Samoska, R. Lin, P. Stek, and I. Mehdi, "Cryogenic Amplifier Based Receivers for Submillimeter-Wave Sounders," *Proceedings of the Earth Science Technology Forum 2013*, Leesburg, Virginia, June 2013.

[4] K. B. Cooper, T. Reck, C. Jung-Kubiak, C. Lee, J. Siles, R. Lin, A. Peralta, E. Decrossas, E. Schlecht, ***G. Chattopadhyay***, and I. Mehdi, "Transceiver Array Development for Submillimeter-Wave Imaging Radars," *Proceedings of SPIE Defense, Security, and Sensing*, vol. 8715, Baltimore, Maryland, USA, May 2013.

[5] C. Lee, ***G. Chattopadhyay***, C. Jung, T. Reck, M. Alonso Del Pino, N. Llombart Juan, K. Cooper, A. Peralta, R. Lin, and I. Mehdi, "Silicon Microlens Antenna for Multi-Pixel THz Heterodyne Detector Arrays," *Proceedings of the 7th European Conference on Antennas and Propagation*, Gothenburg, Sweden, April 2013.

[6] ***G. Chattopadhyay***, "Silicon Micromachined Integrated Array Instruments at Terahertz Frequencies," *Proceedings of the IEEE International Wireless Symposium*, Beijing, China, April 2013.

[7] J. V. Siles, B. Thomas, C. Lee, R. Lin, A. Maestrini, E. Schlecht, ***G. Chattopadhyay***, and I. Mehdi, "First All-Solid-State Heterodyne Broadband Receiver for Planetary Atmospheric Spectroscopy at 1.2 THz," *Proceedings of the International Space Terahertz Technology Symposium*, Groningen, The Netherlands, April 2013.

[8] J. V. Siles, C. Lee, C. Jung, T. Reck, R. Lin, A. Peralta, E. Schlecht, I. Mehdi, and ***G. Chattopadhyay***, "A Novel Ultra-Compact Si-packaged On-Chip Power-Combined 550 GHz Frequency Tripler: First Results," *Proceedings of the International Space Terahertz Technology Symposium*, Groningen, The Netherlands, April 2013.

[9] T. Reck, C. Jung, J. Siles, B. Thomas, R. Lin, I. Mehdi, and ***G. Chattopadhyay***, "A Micromachined Dual-Polarization Single-Sideband Receiver Operating at 520-600 GHz," *Proceedings of the International Space Terahertz Technology Symposium*, Groningen, The Netherlands, April 2013.

[10] K. Cooper, T. Reck, C. Jung, J. Siles, C. Lee, R. Lin, E. Schlecht, ***G. Chattopadhyay***, and I. Mehdi, "Development of Multi-Pixel Submillimeter-Wave Imaging Radar Front-end Technology," *Proceedings of the International Space Terahertz Technology Symposium*, Groningen, The Netherlands, April 2013.

[11] ***G. Chattopadhyay***, "Silicon Micromachined Receiver Front-End at Terahertz Frequencies," *Proceedings of the International Workshop on Antenna Technology*, Karlsruhe, Germany, March 2013.

Year 2012

[1] ***G. Chattopadhyay***, T. Reck, E. Schlecht, R. Lin, and W. Deal, "Cryogenic Amplifier Based Receivers at Submillimeter Wavelengths," *Proceedings of the 37th International Conference on Infrared, Millimeter, and Terahertz Waves*, Wollongong, Australia, November 2012.

[2] C. Lee, ***G. Chattopadhyay***, K. Cooper, and I. Mehdi, "Curvature Control of Silicon Microlens for THz Dielectric Antenna," *Proceedings of the 37th International Conference on Infrared, Millimeter, and Terahertz Waves*, Wollongong, Australia, November 2012.

[3] A. Maestrini, I. Mehdi, J. V. Siles, J. S. Ward, R. H. Lin, B. C. Thomas, C. Lee, J. G. Gill, ***G. Chattopadhyay***, E. Schlecht, J. C. Pearson, and P. H. Siegel, "Frequency Tunable Electronic Sources Working at Room Temperature in the 1 to 3 THz Band," *Proceedings of SPIE, Optical Engineering and Applications*, vol. 8496, San Diego, CA, August 2012.

[2] J. Siles, ***G. Chattopadhyay***, E. Schlecht, C. Lee, R. Lin, J. Gill. C. Jung, I. Mehdi, A. Maestrini, and P. H. Siegel, "Next Generation Solid-State Broadband Frequency-Multiplied Terahertz Sources," *Proceedings of the IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting,* Chicago, Illinois, USA, July 2012.

[2] T. Reck, C. Jung-Kubiak, C. Lee, *G. Chattopadhyay*, N. Llombart, and I. Mehdi, "Terahertz Antenna Arrays," *Proceedings of the IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting,* Chicago, Illinois, USA, July 2012.

[3] E. Shirokoff, P. Barry, C. M. Bradford, *G. Chattopadhyay*, P. Day, S. Doyle, S. Hailey-Dunsheath, A. Kovacs, C. McKenny, H. G. LeDuc, N. Llombart, D. P. Marrone, P. Mauskopf, R. O'Brient, S. Padin, L. Swenson, and J. Zmuidzinas, "SuperSpec: An On-Chip, Millimeter-Wave, Filter-Bank Spectrometer with MKID Readout," *Proceedings of the SPIE Astronomical Telescopes and Instrumentation*, Amsterdam, Netherlands, July 2012.

[4] I. Mehdi, J. Siles, R. Lin, *G. Chattopadhyay*, C. Lee, J. Gill, E. Schlecht, T. Reck, and C. Jung, "Local Oscillator Sub-systems for Array Receivers in the 1-3 THz range," *Proceedings of the SPIE Astronomical Telescopes and Instrumentation*, Amsterdam, Netherlands, July 2012.

[5] A. Kovacs, P. Barry, C. M. Bradford, *G. Chattopadhyay*, P. Day, S. Doyle, S. Hailey-Dunsheath, C. McKenny, H. G. LeDuc, N. Llombart, D. P. Marrone, P. Mauskopf, R. O'Brient, S. Padin, E. Shirokoff, L. Swenson, and J. Zmuidzinas, "SuperSpec Millimeter-Wave On-Chip Spectrometer," *Proceedings of the SPIE Astronomical Telescopes and Instrumentation*, Amsterdam, Netherlands, July 2012.

[6] W. Jellema, A. Baryshev, *G. Chattopadhyay*, H. Driel, R. Huisman, M. Arkhipov, S. Likhachev, and N. Kardashev, "An Optical Design Study for Future THz Heterodyne Instrumentation," *Proceedings of the SPIE Astronomical Telescopes and Instrumentation*, Amsterdam, Netherlands, July 2012.

[7] W. R. Deal and *G. Chattopadhyay*, "InP HEMT Integrated Circuits for Submillimeter Wave Radiometers in Earth Remote Sensing," *Proceedings of the IEEE International Microwave Symposium Digest*, Montreal, Canada, June 2012.

[8] C. Jung-Kubiak, J. Gill, T. Reck, C. Lee , J. Siles, *G. Chattopadhyay*, R. Lin, K. Cooper and I. Mehdi, "Silicon Microfabrication Technologies for THz Applications," *Proceedings of the IEEE Silicon Nanoelectronics Workshop*, Honolulu, Hawaii, June 2012.

[9] T. Reck, J. Siles, C. Jung, J. Gill, C. Lee, *G. Chattopadhyay*, I. Mehdi, and K. B. Cooper, "Array Technology for Terahertz Imaging," *Proceedings of the SPIE Defense, Security, and Sensing Conference*, Baltimore, Maryland, USA, April 2012.

[10] *G. Chattopadhyay*, P. Barry, C. M. Bradford, P. Day, S. Doyle, S. Hailey-Dunshath, A. Kovacs, H. G. Leduc, N. Llombart, C. McKenny, D. P. Marrone, P. Mauskopf, R. O'Brient, S. Padin, T. Reck, E. Shirokoff, J. Siles, L. Swenson, and J. Zmuidzinas, "Ultra-Compact Superconducting Spectrometer on a Chip at Submillimeter Wavelengths," *Proceedings of the 23rd International Symposium on Space Terahertz Technology*, Tokyo, Japan, April 2012.

[11] J. Siles, *G. Chattopadhyay*, A. Maestrini, R. Lin, C. Lee, C. Jung, J. Gill, A. Peralta, E. Schlecht, and I. Mehdi, "Enabling Compact Multi-Pixel Heterodyne Terahertz Receivers Using On-Chip Power-Combined Multiplied Sources," *Proceedings of the 23rd International Symposium on Space Terahertz Technology*, Tokyo, Japan, April 2012.

[12] T. Reck, C. Jung, J. Siles, B. Thomas, J. Gill, J. Ward, R. Line, I. Mehdi, and *G. Chattopadhyay*, "PASEO – An Integrated Radiometer and Spectrometer for Improved Planetary Science," *Proceedings of the 23rd International Symposium on Space Terahertz Technology*, Tokyo, Japan, April 2012.

[13] *G. Chattopadhyay*, N. Llombart, C. Lee, C. Jung, R. Lin, K. B. Cooper, T. Reck, J. Siles, E. Schlecht, A. Peralta, B. Thomas, and I. Mehdi, "Terahertz Array Receivers with Integrated Antennas," *Proceedings of the IEEE International Workshop on Antenna Technology: Small Antennas and Unconventional Applications*, Tucson, Arizona, March 2012.

Year 2011

[1] *G. Chattopadhyay*, "Terahertz Radar and its Imaging Capabilities," *Proceedings of the IEEE Applied Electromagnetics Conference and Indian Antenna Week*, Kolkata, India, December 2011.

[2] *G. Chattopadhyay*, "Terahertz Radar for Security Applications," *Proceedings of the International Radar Symposium India 2011 (IRSI-11)*, Bangalore, India, November 2011.

[3] *G. Chattopadhyay*, "Terahertz Radar for Stand-Off Through-Clothes Imaging," *Proceedings of the International Conference on Sensor Technology*, Palmerston North, New Zealand, November 2011.

[4] C. Jung, C. Lee, *G. Chattopadhyay*, J. Siles, T. Reck, R. Lin, K. Cooper, and I. Mehdi, "Silicon Nanofabrication Technologies for Compact Integrated Receivers working at THz Frequencies," *Proceedings of the 36th International Conference on Infrared, Millimeter, and Terahertz Waves*, Houston, Texas, October 2011.

[5] M. Alonso, N. Llombart, C. Lee, C. Jung, *G. Chattopadhyay*, L. Jofre, and I. Mehdi, "Micro-Lens Antennas for THz Integrated Arrays," *Proceedings of the 36th International Conference on Infrared, Millimeter, and Terahertz Waves*, Houston, Texas, October 2011.

[6] C. Lee, N. Llombart, C. Jung, *G. Chattopadhyay*, and I. Mehdi, "Silicon Micromachined Microlens Array for THz Antennas," *Proceedings of the 36th International Conference on Infrared, Millimeter, and Terahertz Waves*, Houston, Texas, October 2011.

[7] *G. Chattopadhyay*, K. B. Cooper, R. J. Dengler, N. Llombart, and P. H. Siegel, "Imaging at Stand-Off Distance with Terahertz FMCW Radar," *Proceedings of the URSI General Assembly*, Istanbul, Turkey, August 2011.

[8] *G. Chattopadhyay*, N. Llombart, C. Lee, B. Thomas, R. Lin, A. Peralta, and I. Mehdi, "Integrated Arrays on Silicon at Terahertz Frequencies," *Proceedings of the IEEE International Symposium on Antennas and Propagation and USNC/URSI National Radio Science Meeting*, Spokane, Washington, July 2011.

[9] C. Jung, B. Thomas, C. Lee, A. Peralta, *G. Chattopadhyay*, J. Gill. R. Lin, E. Schlecht, and I. Mehdi, "Compact Submillimeter-wave Receivers made with Semiconductor Nano-Fabrication Technologies," *IEEE International Microwave Symposium Digest*, Baltimore, MD, June 2011.

[10] *G. Chattopadhyay*, E. Schlecht, C. Lee, J. Gill. R. Lin, S. Sin, I. Mehdi, W. Deal, K. K. Loi, P. Nam, and B. Rodriguez "670 GHz Schottky Diode Based Subharmonic Mixer with CPW Circuits and 70 GHz IF," *Proceedings of the 22nd International Symposium on Space Terahertz Technology*, Tucson, AZ, April 2011.

[11] J. V. Siles, B. Thomas, *G. Chattopadhyay*, A. Maestrini, C. Lee, E. Schlecht, C. Jung, and I. Mehdi, "Design of a high-power 1.6 THz Schottky tripler using 'on-chip' power-combining and Silicon micro-machining," *Proceedings of the 22nd International Symposium on Space Terahertz Technology*, Tucson, AZ, April 2011.

[12] A. Y. Tang, E. Schlecht, *G. Chattopadhyay*, R. Lin, C. Lee, J. Gill, I. Mehdi, and J. Stake, "Steady-State and Transient Thermal Analysis of High-Power Planar Schottky Diodes," *Proceedings of the 22nd International Symposium on Space Terahertz Technology*, Tucson, AZ, April 2011.

[13] C. Jung, B. Thomas, C. Lee, A. Peralta, *G. Chattopadhyay*, J. Gill. R. Lin, E. Schlecht, and I. Mehdi, "Silicon Micromachining Technology for THz applications," *Proceedings of the 22nd International Symposium on Space Terahertz Technology*, Tucson, AZ, April 2011.

[14] A. Navarrini, C. Groppi, and *G. Chattopadhyay*, "Test of a Waveguide OMT for the 385-500 GHz Band," *Proceedings of the 22nd International Symposium on Space Terahertz Technology*, Tucson, AZ, April 2011.

[15] N. Llombart, B. Thomas, M. Alonso, *G. Chattopadhyay*, C. Lee, L. Jofre, and I. Mehdi, "Silicon Based Antennas for THz Integrated Arrays," *Proceedings of the European Conference on Antennas and Propagation*, Rome, Italy, April 2011.

[16] X. Amashukeli, *G. Chattopadhyay*, P. Siegel, R. Lin, A. Peralta, and R. Toda, "RF-Powered Aqueous Extractor for Identification of Chemical Signatures of Life on Mars, Comets, and Asteroids," *Proceedings of the IEEE Aerospace Conference*, Big Sky, Montana, March 2011.

Year 2010-1995

[1] *G. Chattopadhyay*, "Terahertz Technology," *Proceedings of the International Symposium on Microwaves-2010*, Bangalore, India, December 2010.

[2] X. Amashukeli, *G. Chattopadhyay*, A. Fisher, J. Frank, R. Lin, A. Peralta, and P. Siegel, "New Generation of Micro-Scale Sample-Processing Instruments for Future Exploration of Mars and Near Earth Objects (NEO)," *Proceedings of the American Geophysical Union*, Fall Meeting, San Francisco, December 2010.

[3] C. Jung, C. Lee, B. Thomas, *G. Chattopadhyay*, A. Peralta, R. Lin, J. Gill, and I. Mehdi, "Silicon Micromachining Technology for THz Applications," *Proceedings of the 35th International Conference on Infrared, Millimeter, and THz Waves*, Rome, Italy, September 2010.

[4] C. Lee, B. Thomas, *G. Chattopadhyay*, A. Peralta, R. Lin, and I. Mehdi, "Silicon Micromachined Components at Terahertz Frequencies for Space Applications," *Proceedings of the Hilton Head Solid-State Sensors, Actuators, and Microsystems Workshop*, Hilton Head, South Carolina, June 2010.

[5] K. Cooper, R. Dengler, N. Llombert, T. Bryllert, *G. Chattopadhyay*, I. Mehdi, B. Thomas, and P. H. Siegel, "Fast, high-resolution terahertz radar imaging at 25 meters," *Proceedings of SPIE*, Orlando, Florida, April 2010.

[6] I. Mehdi, B. Thomas, C. Lee, *G. Chattopadhyay*, R. Lin, E. Schlecht, A. Peralta, J. Gill, K. Cooper, N. Llombert, and P. H. Siegel, "Radiometer-on-a-Chip: A Path Towards Super-Compact Submillimeter-Wave Imaging Arrays," *Proceedings of SPIE*, Orlando, Florida, 2010.

[7] C. Lee, B. Thomas, *G. Chattopadhyay*, A. Peralta, R. Lin, and I. Mehdi, "Silicon Micromachining Technology for Passive THz Components," *Proceedings of the 21st International Symposium on Space Terahertz Technology*, Oxford, England, March 2010.

[8] A. Navarrini, C. Groppi, and *G. Chattopadhyay*, "A Waveguide Orthomode Transducer for 385-500 GHz," *Proceedings of the 21st International Symposium on Space Terahertz Technology*, Oxford, England, March 2010.

[9] B. Thomas, C. Lee, A. Peralta, J. Gill, *G. Chattopadhyay*, E. Schlecht, R. Lin, and I. Mehdi, "600 GHz Silicon-based integrated receiver using GaAs MMIC membrane planar Schottky diodes," *Proceedings of the 21st International Symposium on Space Terahertz Technology*, Oxford, England, March 2010.

[10] R. Lin, B. Thomas, J. Ward, A. Maestrini, E. Schlecht, *G. Chattopadhyay*, J. Gill, C. Lee, S. Sin, F. Maiwald, and I. Mehdi, "Development of Local Oscillators for CASIMIR," *Proceedings of the 21st International Symposium on Space Terahertz Technology*, Oxford, England, March 2010.

[11] I. Mehdi, B. Thomas, C. Lee, B. Drouin, J. Pearson, *G. Chattopadhyay*, E. Schlecht, A. Skalare, J. Gill, and R. Lin, "Radiometer-on-a-Chip: A Breakthrough Technology for In-Situ Submillimeter Space Instruments," *Proceedings of the 2010 IEEE Aerospace Conference*, Big Sky, Montana, March 6-13, 2010.

[12] N. Llombart, *G. Chattopadhyay*, and C. Lee, "Micro-Lens Antenna for Integrated Terahertz Arrays," *Proceedings of the 2010 International Workshop on Antenna Technology: Small Antennas, Innovative Structures, and Materials*, Lisbon, Portugal, March 2010.

[13] X. Amashukeli, H. Manohara, *G. Chattopadhyay*, E. Urgiles, R. Lin, A. Peralta, and A. Fisher, "Universal RF-Powered Aqueous Extractor-on-a-Chip Instrument for Identification of Chemical Signatures of Life on Mars," *Proceedings of the American Geophysical Union*, Fall Meeting, San Francisco, December 2009.

[14] J. S. Moon, K. Son, *G. Chattopadhyay*, and D. Ting, "Development of Optical Antenna-Coupled Si CMOS-based detector at 30 THz," *Proceedings of SPIE, Terahertz Physics, Devices, and Systems III: Advanced Application in Industry and Defense*, vol. 7311, Orlando, FL, April 2009.

[15] X. Amashukeli, H. Manohara, *G. Chattopadhyay*, and E. Urgiles, "Microfluidic Biomarker Extraction based on Modulation of Dielectric Constant of Water," *Proceeding of the European Geosciences Union General Assembly*, Vienna, Austria, April 2009.

[16] C. Lee, J. Ward, R. Lin, *G. Chattopadhyay*, E. Schlecht, J. Gill, B. Thomas, A. Maestrini, I. Mehdi, and P. H. Siegel, "Diamond Heat-Spreaders for Submillimeter-Wave GaAs Schottky Diode Frequency Multipliers," *Proceedings of the 20th International Symposium on Space Terahertz Technology*, Charlottesville, Virginia, March 2009.

[17] *G. Chattopadhyay*, J. Ward, H. Manohara, R. Toda, and R. H. Lin, "Deep Reactive Ion Etching Based Silicon Micromachined Components at Terahertz Frequencies for Space Applications," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[18] A. Skalare, *G. Chattopadhyay*, E. Schlecht, J. Gill, M. Allen, K. Cooper, S. Gulkis, I. Mehdi, P. H. Siegel, and J. Pearson, "Radiometers for Exploration of Moons of Outer Planets," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[19] J. Ward, *G. Chattopadhyay*, J. Gill, H. Javadi, C. Lee, R. H. Lin, A. Maestrini, F. Maiwald, I. Mehdi, and E. Schlecht, "Tunable Broadband Frequency Multiplied Terahertz Sources," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[20] E. Schlecht, *G. Chattopadhyay*, J. Gill, R. H. Lin, and I. Mehdi, "New 600 GHz Balanced and Subharmonically Pumped Mixers with Reduced LO Power and State of the Art Performance," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[21] A. Maestrini, J. Ward, *G. Chattopadhyay*, E. Schlecht, J. Gill, C. Lee, H. Javadi, and I. Mehdi, "In-Phase Power Combining of Submillimeter-Wave Frequency Multipliers," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[22] J. Ward, K. Lee, J. Kawamura, *G. Chattopadhyay*, and P. Stek, "Sensitive Broadband SIS Receivers for Microwave Limb Sounding," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[23] K. Cooper, R. Dengler, N. Llombert, T. Bryllert, *G. Chattopadhyay*, E. Schlecht, J. Gill, C. Lee, I. Mehdi, and P. H. Siegel, "Concealed Object Contrast Enhancement Using Radar Methods in a Submillimeter-Wave Active Imager," *Proceedings of the 33rd International Conference on Infrared, Millimeter, and Terahertz Waves*, California Institute of Technology, Pasadena, CA, September 2008.

[24] M. M. Mojarradi, *G. Chattopadhyay*, H. Manohara, T. A. Vo, H. Mojarradi, and N. Marzwell, "Scalable Millimeter Wave Wireless Power Receiver Technology for Space Application," *Proceedings of the American Institute of Aeronautics and Astronautics Space 2008 Conference*, San Diego, CA, September 2008.

[25] N. Llombart, C. M. Bradford, A. Neto, and *G. Chattopadhyay*, "Impedance Matching of a Micromesh Bolometer Placed in a Silicon Parallel Plate Waveguide Spectrometer," *Proceedings of the IEEE Symposium on Antennas and Propagation*, San Diego, CA, July 2008.

[26] C. L. Kuo, J. J. Bock, J. A. Bonetti, J. Brevik, G. Chattopadhyay, P. K. Day, S. Golwala, M. Kenyon, A. E. Lange, H. G. LeDuc, H. Nguyen, R. W. Ogburn, A. Orlando, A. Transgrud, A. Turner, G. Wang, and J. Zmuidzinas, "Antenna-Coupled TES Bolometer Arrays for CMB Polarimetry," *Proceedings of SPIE*, *Astronomical Telescopes and Instrumentation, Millimeter and Submillimeter*

Detectors and Instrumentation for Astronomy IV. Edited by Zmuidzinas, J.; Holland, W. S.; Withington, S.; Duncan, W. D., vol. 7020, Marseille, France, June 2008.

[27] J. S. Ward, K. Lee, J. Kawamura, *G. Chattopadhyay*, and P. Stek, "Sensitive Broadband Receivers for Microwave Limb Sounding," *Proceedings of the Eighth Annual NASA Earth Science Technology Conference*, University of Maryland University College, Adelphi, MD, June 2008.

[28] M. Allen, R. Carlson, K. Cooper, B. Drouin, K. Hand, A. Skalare, P. Beauchamp, J. Pearson, H. Pickett, D. Rodgers, P. Siegel, S. Gulkis, and *G. Chattopadhyay*, "Astrobiology from Europan Orbit," *Proceedings of the 5th Astrobiology Science Conference*, Santa Clara, CA, April 2008.

[29] *G. Chattopadhyay*, J. Ward, H. Manohara, R. Toda, and R. Lin, "Silicon Micromachined Components at Terahertz Frequencies for Astrophysics and Planetary Applications," Proceedings *of the Nineteenth International Symposium on Space Terahertz Technology*, Groningen, Netherlands, April 2008.

[30] *G. Chattopadhyay*, K. Cooper, R. Dengler, T. E. Bryllert, E. Schlecht, A. Skalare, I. Mehdi, and P. H. Siegel, "A 600 GHz Imaging Radar for Contraband Detection," *Proceedings of the Nineteenth International Symposium on Space Terahertz Technology*, Groningen, Netherlands, April 2008.

[31] P. C. Stek, *G. Chattopadhyay*, R. Coefield, R. Jarnot, J. Kawamura, K. Lee, N. Livesey, and J. Ward, "System Design and Technology Development for an Azimuth Scanning Microwave Limb Sounder," *Proceedings of the American Geophysical Union Fall Meeting*, San Francisco, CA, December 2007.

[32] J. S. Ward, K. A. Lee, J. Kawamura, *G. Chattopadhyay*, and P. C. Stek, "Sensitive Broadband Receivers for Microwave Limb Sounding," *Proceedings of the American Geophysical Union Fall Meeting*, San Francisco, CA, December 2007.

[33] J. Pearson, B. Drouin, M. Allen, R. Carlson, P. Beauchamp, S. Gulkis, H. Pickett, D. Rodgers, P. H. Siegel, A. Skalare, K. Cooper, and *G. Chattopadhyay*, "Radar Spectrometer for Europa Explorer," *Proceedings of the American Geophysical Union Fall Meeting*, San Francisco, CA, December 2007.

[34] *G. Chattopadhyay*, "Sensor Technology at Submillimeter Wavelengths," – *Invited Keynote Paper, International Conference on Sensor Technology*, Palmerston North, New Zealand, November 2007.

[35] *G. Chattopadhyay*, K. B. Cooper, R. J. Dengler, E. Schlecht, J. Gill, A. Skalare, I. Mehdi, and P. H. Siegel, "Submillimeter-Wave Active Radar Imager," *Joint 32nd International Conference on Infrared and Millimeter Waves and 15th International Conference on Terahertz Electronics,* Cardiff, United Kingdom, September 2007.

[36] *G. Chattopadhyay*, C. Kuo, P. Day, J. J. Bock, J. Zmuidzinas, and A. E. Lange, "Planar Antenna Arrays for CMB Polarization Detection," *Proceedings of the Joint 32nd International Conference on Infrared and Millimeter Waves and 15th International Conference on Terahertz Electronics*, pp. 184-185, Cardiff, UK, September 2007.

[37] *G. Chattopadhyay*, C. Kuo, P. Day, J. J. Bock, A. E. Lange, and J. Zmuidzinas, "Slot Antenna Arrays for CMB Polarization Detection," *Proceedings of the Eighteenth International Symposium on Space Terahertz Technology*, Pasadena, CA, March 2007.

[38] *G. Chattopadhyay*, K. B. Cooper, R. J. Dengler, E. Schlecht, A. Skalare, I. Mehdi, and P. H. Siegel, "A 675 GHz FMCW Radar with Sub-Centimeter Range Resolution," *Proceedings of the Eighteenth International Symposium on Space Terahertz Technology,* Pasadena, CA, March 2007.

[39] *G. Chattopadhyay*, "Terahertz Sources, Sensors, and Components - Performance and Capabilities," *SPIE Optics East*, Boston, Massachusetts, October 2006.

[40] I. Mehdi, *G. Chattopadhyay*, E. Schlecht, J. Ward, J. Gill, F. Maiwald, and A. Maestrini, "THz Multiplier Circuits," *2006 IEEE MTT-S International Microwave Symposium Digest,* San Francisco, California, pp. 341-344, June 2006.

[41] C. Kuo, J. J. Bock, *G. Chattopadhyay*, S. R. Golwala, M. E. Kenyon, A. E. Lange, H. G. LeDuc, P. Rossinot, A. Vayonakis, G. Wang, and J. Zmuidzinas, "Antenna Coupled TES Bolometers for CMB Polarimetry," *Proceedings of SPIE, Astronomical Telescopes and Instrumentation, Millimeter and Submillimeter Detectors and Instrumentation for Astronomy III. Edited by Zmuidzinas, J.; Holland, W. S.; Withington, S.; Duncan, W. D.*, vol. 6275, Orlando, Florida, May 2006.

[42] A. Skalare, *G. Chattopadhyay*, I. Mehdi, J. S. Ward, E. T. Schlecht, and P. H. Siegel, "Heterodyne Array Instruments for Submillimeter Wavelengths," *Proceedings of SPIE, Astronomical Telescopes and Instrumentation*, vol. 6275, Orlando, Florida, May 2006.

[43] *G. Chattopadhyay*, J. S. Ward, I. Mehdi, and P. H. Siegel, "TIP: A Terahertz Interferometer for Planets - A Concept Study," *Proceedings of the Seventeenth International Symposium on Space Terahertz Technology*, Paris, France, May 2006.

[44] *G. Chattopadhyay*, ""Heterodyne Arrays at Submillimeter Wavelengths," *XXVIIIth. General Assembly of International Union of Radio Science (URSI)*, New Delhi, India, October 2005.

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[45] *G. Chattopadhyay*, "Future of Heterodyne Receivers at Submillimeter Wavelengths," *Invited Keynote Paper – Joint 30th International Conference on Infrared and Millimeter Waves and 13th International Conference on Terahertz Electronics*, Williamsburg, Virginia, September 2005

[46] D. Schmidt, *G. Chattopadhyay*, et. al., "A Superconductor-Insulator-Normal Metal Bolometer with Microwave Readout Suitable for Large Format Arrays," *Proceedings of the 11th. International Workshop on Low Temperature Detectors (LTD-11)*, Tokyo, Japan, July-August 2005.

[47] J. S. Ward, E. Schlecht, *G. Chattopadhyay*, H. Javadi, J. Gill, and I. Mehdi, "Local Oscillators from 1.4 to 1.9 THz," *Proceedings of the Sixteenth International Symposium on Space Terahertz Technology*, Göteborg, Sweden, May 2005.

[48] A. Maestrini, C. Tripon-Canseliet, J. S. Ward, J. J. Gill, H. S. Javadi, E. Schlecht, *G. Chattopadhyay*, and I. Mehdi, "Multiple-Anode Broadband Frequency Triplers at Submillimeter Wavelengths," *Sixteenth International Symposium on Space Terahertz Technology*, Göteborg, Sweden, May 2005.

[49] J. L. Ullom, D. Schmidt, A. M. Clark, W. D. Duncan, K. D. Irwin, N. Miller, *G. Chattopadhyay*, and K. Lehnert, "Normal-Insulator-Superconductor Junctions with Microwave Readout for Large Arrays of Ultralow NEP Bolometers," *Invited Paper - Proceedings of the URSI National Radio Science Meeting*, Boulder, Colorado, January 5-8, 2005.

[50] *G. Chattopadhyay*, "Development of Multi-Pixel Heterodyne Array Instruments at Submillimeter Wavelengths," *Invited Paper – Asia Pacific Microwave Conference,* New Delhi, India, December 2004

[51] J. W. Kooi, A. Kovacs, B. Bumble, *G. Chattopadhyay*, M. L. Edgar, S. Kaye, R. LeDuc, J. Zmuidzinas, and T. G. Phillips, "Heterodyne Instrumentation Upgrade at the Caltech Submillimeter Observatory," *Proceedings of the SPIE: Astronomical Telescopes and Instrumentation*, Glasgow, Scotland United Kingdom, June 2004.

[52] J. Ward, E. Schlecht, *G. Chattopadhyay*, A. Maestrini, J. Gill, F. Maiwald, H. Javadi, and I. Mehdi, "Capability of THz Sources Based on Schottky Diode Frequency Multiplier Chain,"; *2004 IEEE MTT-S International Microwave Symposium Digest,* Fort Worth, TX, pp. 1587-1590, June 2004.

[53] J. Ward, *G. Chattopadhyay*, A. Maestrini, E. Schlecht, J. Gill, H. Javadi, D. Pukala, F. Maiwald, and I. Mehdi, "Tunable All-Solid-State Local Oscillators to 1900 GHz," *Proceedings of the Fifteenth International Symposium on Space Terahertz Technology*, Northampton, MA, April 2004.

[54] A. Maestrini, J. Ward, J. Gill, *G. Chattopadhyay*, F. Maiwald, K. Ellis, H. Javadi, and I. Mehdi, "A Planar-Diode Frequency Tripler at 1.9 THz," *2003 IEEE MTT-S International Microwave Symposium Digest*, Philadelphia, PA, pp. 747-750, June 2003.

[55] J. Ward, F. Maiwald, *G. Chattopadhyay*, A. Maestrini, E. Schlecht, J. Gill, and I. Mehdi, "1400-1900 GHz Local Oscillators for the Herschel Space Observatory," *Proceedings of the Fourteenth International Symposium on Space Terahertz Technology*, Tucson, AZ, pp. 94-101, April 22-24, 2003.

[56] *G. Chattopadhyay*, E. Schlecht, F. Maiwald, R. J. Dengler, J. C. Pearson, and I. Mehdi, "Frequency Multiplier Response to Spurious Signals and its Effect on Local Oscillator Systems in Millimeter and Submillimeter Wavelengths," *Proceedings of SPIE: International Conference on Astronomical Telescopes and Instrumentation*, vol. 4855, pp. 480-488, Waikoloa, Hawaii, August 22-28, 2002.

[57] I. Mehdi, E. Schlecht, *G. Chattopadhyay*, and P. Siegel, "THz Local Oscillator Source: Performance and Capabilities," *Invited Paper – Proceedings of SPIE: International Conference on Astronomical Telescopes and Instrumentation*, vol. 4855, pp. 435-446, Waikoloa, Hawaii, August 22-28, 2002.

[58] B. Rowand, J. J. Bock, *G. Chattopadhyay*, J. Glen, and M. Griffin, "Design and Performance of Feed-Horn Coupled Bolometer Arrays for SPIRE," *Proceedings of SPIE: International Conference on Astronomical Telescopes and Instrumentation,* vol. 4855, pp. 510-519, Waikoloa, Hawaii, August 22-28, 2002.

[59] F. Maiwald, E. Schlecht, A. Maestrini, *G. Chattopadhyay*, J. C. Pearson, D. Pukala, and I. Mehdi, "THz Frequency Multiplier Chains Based on Planar Schottky Diodes," *Invited Paper – Proceedings of SPIE: International Conference on Astronomical Telescopes and Instrumentation*, vol. 4855, pp. 447-458, Waikoloa, Hawaii, August 22-28, 2002.

[60] I. Mehdi, E. Schlecht, *G. Chattopadhyay*, and P. H. Siegel, "THz Local Oscillator Sources," *Invited Paper – Far-IR, Submm, and mm Detector Technology Workshop*, Monterey, CA, April 2002.

[61] A. Maestrini, *G. Chattopadhyay*, E. Schlecht, and I. Mehdi, "1400 - 1900 GHz Membrane Based Schottky Diode Triplers," *Proceedings of the 13th International Symposium on Space Terahertz Technology*, Cambridge, MA, pp. 167-176, March 26-28, 2002.

[62] E. Schlecht, *G. Chattopadhyay*, A. Maestrini, D. Pukala, J. Gill, and I. Mehdi, "Harmonic Balance Optimization of Terahertz Schottky Diode Multipliers Using an Advanced Device Model," *Proceedings of the 13th International Symposium on Space Terahertz Technology, Cambridge*, MA, pp. 187-196, March 26-28, 2002.

[63] N. Erickson, G. Narayanan, E. Grosslein, *G. Chattopadhyay*, A. Maestrini, E. Schlecht, I. Mehdi, and S. Martin, "1.5 THz All-Planar Multiplied Source," *Proceedings of the 13th International Symposium on Space Terahertz Technology*, Cambridge, MA, pp. 177-186, March 26-28, 2002.

[64] *G. Chattopadhyay*, E. Schlecht, J. Gill, S. Martin, F. Maiwald, A. Maestrini, D. Pukala, and I. Mehdi, "An 800 GHz Broadband Planar Schottky Balanced Doubler," *Proceedings of the 9th International Conference on Terahertz Electronics*, Charlottesville, VA, October 15-16, 2001.

[65] E. Schlecht, *G. Chattopadhyay*, J. Gill, A. Fung, S. Martin, A. Maestrini, D. Pukala, F. Maiwald, and I. Mehdi, "A High-Power Wideband Cryogenic 200 GHz Schottky Substrateless Multiplier: Modeling, Design, and Results," *Proceedings of the 9th International Conference on Terahertz Electronics*, Charlottesville, VA, October 15-16, 2001.

[66] J. W. Kooi, *G. Chattopadhyay*, F. Rice, and J. Zmuidzinas, "A Full-Height Waveguide to Thin film Microstrip Transition with Exceptional RF Bandwidth and Coupling Efficiency," *Proceedings of the 9th International Conference on Terahertz Electronics, Charlottesville*, VA, October 15-16, 2001.

[67] A. Maestrini, D. Pukala, *G. Chattopadhyay*, E. Schlecht, S. Martin, and I. Mehdi, "Design Considerations for a *1900 GHz Tripler Based on Membrane Diode Technology," Proceedings* of the 9th International Conference on Terahertz Electronics, Charlottesville, VA, October 15-16, 2001.

[68] D. Pukala, A. Maestrini, *G. Chattopadhyay*, E. Schlecht, S. Martin, and I. Mehdi, "Diode Parameter Extraction and Circuit Optimization Based on Multiplier Performance Measurements in the THz Range," *Proceedings of the 9th International Conference on Terahertz Electronics*, Charlottesville, VA, October 15-16, 2001.

[69] E. Schlecht, *G. Chattopadhyay*, A. Maestrini, A. Fung, S. Martin, J. Bruston, and I. Mehdi, "200, 400, and 800 GHz Schottky Diode Substrateless Multipliers: Design and Results," *2001 IEEE MTT-S International Microwave Symposium Digest*, Phoenix, AZ, pp. 1649-1652, May 2001.

[70] E. Schlecht, F. Maiwald, *G. Chattopadhyay*, S. Martin, and I. Mehdi, "Design Considerations for Heavily-Doped Cryogenic Schottky Diode Varactor Multipliers," *Proceedings of the Twelfth International Space Terahertz Technology Symposium*, Humphreys Half Moon Inn, San Diego, CA, pp. 485-494, February 2001.

[71] J. W. Kooi, *G. Chattopadhyay*, M. Thielman, T. G. Phillips, and R. Schieder, "SIS Receiver Noise Stability," *Proceedings of the Eighth International Conference on Terahertz Electronics*, Darmstadt University of Technology, Darmstadt, Germany, pp. 137-140, September 2000.

[72] A. Maestrini, D. Pukala, F. Maiwald, E. Schlecht, *G. Chattopadhyay*, and I. Mehdi, "Cryogenic Operation of GaAs Based Multiplier Chains to 400 GHz," *Proceedings of the Eighth International Conference on Terahertz Electronics*, Darmstadt University of Technology, Darmstadt, Germany, pp. 81-84, September 2000.

[73] I. Mehdi, E. Schlecht, *G. Chattopadhyay*, S. Martin, A. Maestrini, F. Maiwald, J. Bruston, L. Samoska, and D. Pukala, "GaAs Based Terahertz Sources for Space Applications: Challenges and Prospects," *Invited Paper – Proceedings of SPIE: 45th Annual Meeting on Terahertz and Gigahertz Electronics and Photonics*, San Diego, CA, August 2000.

[74] J. W. Kooi, J. Kawamura, J. Chen, *G. Chattopadhyay*, J. R. Pardo, J. Zmuidzinas, T. G. Phillips, B. Bumble, J. Stern, and H. G. LeDuc, "A Low Noise NbTiN-based 850 GHz SIS Receiver for the Caltech Submillimeter Observatory," *Proceedings of the Eleventh International Space Terahertz Technology Symposium*, University of Michigan, Ann Arbor, MI, pp. 116-128, May, 2000.

[75] F. Rice, J. Ward, J. Zmuidzinas, and *G. Chattopadhyay*, "SuperMix Now Available," *Proceedings of the Eleventh International Space Terahertz Technology Symposium*, University of Michigan, Ann Arbor, MI, pp. 341-342, May, 2000.

[76] Ward, F. Rice, *G. Chattopadhyay*, and J. Zmuidzinas, "Supermix: A Flexible Software Library for High-Frequency Circuit Simulation, Including SIS Mixers and Superconducting Elements," *Proceedings of the Tenth International Space Terahertz Technology Symposium*, University of Virginia, Charlottesville, VA, pp. 269-281, March, 1999.

[77] *G. Chattopadhyay*, D. Miller, H. G. LeDuc, and J. Zmuidzinas, "A 550-GHz Dual Polarized Quasi-Optical SIS Mixer," *Proceedings of the Tenth International Space Terahertz Technology Symposium*, University of Virginia, Charlottesville, VA, pp. 130-143, March 1999.

[78] F. Rice, J. Ward, J. Zmuidzinas, and *G. Chattopadhyay*, "Fast Harmonic Balance of SIS Mixers with Multiple Junctions and Superconducting Circuits," *Proceedings of the Tenth International Space Terahertz Technology Symposium*, University of Virginia, Charlottesville, VA, pp. 282-297, March, 1999.

[79] J. W. Kooi, F. Rice, *G. Chattopadhyay*, S. Sundarum, S. Weinreb, and T. Phillips, "Regarding the IF Output Conductance of SIS Tunnel Junctions and the Integration with Cryogenic InP MMIC Amplifiers," *Proceedings of the Tenth International Space Terahertz Technology Symposium*, University of Virginia, Charlottesville, VA, pp. 100-106, March, 1999.

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[80] J. Glenn, J. J. Bock, *G. Chattopadhyay*, S. F. Edgington, A. E. Lange, J. Zmuidzinas, P. D. Mauskopf, B. Rownd, L. Yuen, and P. A. R. Ade, "Bolocam : A Millimeter-Wave Bolometric Camera," *Proceedings of SPIE : Advanced Technology MMW, Radio, and Terahertz Telescopes*, vol.3357, pp. 326-334, Kona, Hawaii, March, 1998.

[81] J. Zmuidzinas, J. W. Kooi, J. Kawamura, *G. Chattopadhyay*, J. A. Stern, B. Bumble, and H. G. LeDuc, "Development of SIS Mixers for 1 THz," *Proceedings of SPIE : Advanced Technology MMW, Radio, and Terahertz Telescopes*, vol.3357, pp. 53-61, Kona, Hawaii, May, 1998.

[82] J. W. Kooi, J. A. Stern, *G. Chattopadhyay*, H. LeDuc, B. Bumble, and J. Zmuidzinas, "Low-Loss NbTiN Films for THz SIS Mixer Tuning Circuits," *Proceedings of the Ninth International Space Terahertz Technology Symposium*, Jet Propulsion Laboratory, Pasadena, CA, pp. 283-294, March 1998.

[83] J. W. Kooi, J. A. Stern, *G. Chattopadhyay*, H. G. LeDuc, B. Bumble, and J. Zmuidzinas, "Low-Loss NbTiN Films for THz SIS Mixer Tuning Circuits," *Proceedings of the Eighth International Space Terahertz Technology Symposium*, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, pp. 310-318, March, 1997.

[84] J. L. Hesler, T. W. Crowe, R. F. Bradley, S-K Pan, and *G. Chattopadhyay*, "The Design, Construction and Evaluation of a 585 GHz Planar Schottky Mixer," Proceedings of the Sixth International Space Terahertz Technology Symposium, California Institute of Technology, Pasadena, CA, pp. 34-43, March, 1995.