

**Duration: 09:00 – 18:20**

**Room: N110**

**WS-06**

**Terahertz Technologies from Fundamentals to Implementations: A Device and Application Prospective**

**Organisers:**

Dimitris Pavlidis<sup>1</sup>, Imran Mehdi<sup>2</sup>, Javier Mateos<sup>3</sup>

<sup>1</sup>Boston University and National Science Foundation, <sup>2</sup>Jet Propulsion Laboratory, <sup>3</sup>University of Salamanca

**Abstract**

THz technology opens up new possibilities for various applications extending among other from sensing and spectroscopy to communications and imaging. While important advances have been made over the last two decades, THz technology can benefit from further developments in the area of devices, circuits and system implementation. This requires understanding of fundamentals, consideration of new device concepts and/or optimization of their characteristics, hybrid or integrated approaches for circuit realization and use of the knowledge obtained from such studies for system development. This workshop will bring together experts from various academic, national labs and commercial enterprises to discuss the most recent advances in their respective fields and to provide insight into what the future might hold for exploration of this frequency range. It will focus on a variety of materials such as traditional III-Vs, III-Nitrides, Silicon, Graphene and Transition metal dichalcogenides (TMDs), as well as various device concepts for efficient THz generation and detection. The operation of the components to be discussed is based on plasmonics, photoconductors, plasma waves, photomixing, Resonant Tunneling, Negative Differential Resistance and CMOS. Devices such as Quantum Cascade Lasers and Self-switching Diodes will also be addressed. Advanced Sensing, Imaging and Communications and terrestrial, space applications will be discussed. The Workshop is intended for young scientists and engineers who are interested in learning about this emerging field, as well as individuals with a more advanced understanding of related concepts. The topics addressed include fundamental and engineering considerations together with the latest results in Terahertz technology.

***Programme***

**THz Applications: From Devices to Space Systems**

Imran Mehdi<sup>1</sup>

<sup>1</sup>Jet Propulsion Laboratory

**Fundamentals and Latest Results on Nitride-based Two and Three-Terminal Devices for Frequencies Extending to THz**

Dimitris Pavlidis<sup>1</sup>

<sup>1</sup>Boston University and National Science Foundation

### **Self-switching Nanodiodes for THz Detection**

Javier Mateos<sup>1</sup>

<sup>1</sup>University of Salamanca

### **THz Oscillators Using Resonant Tunneling Diodes and their Functions for Various Applications**

Masahiro Asada<sup>1</sup>, Safumi Suzuki<sup>1</sup>

<sup>1</sup>Tokyo Institute of Technology

### **Cutting the Gordian Knot of THz Biospectroscopy: The Critical Effect of Hydration**

E. R. Brown<sup>1</sup>, W-D. Zhang<sup>1</sup>, A. Bykhovski<sup>2</sup>

<sup>1</sup>Wright State University, <sup>2</sup>North Carolina State University

### **Terahertz Electronics using GaN-based Schottky Barrier Diodes and FinFETs and HgCdTe Bulk Films for Emission**

Wojciech Knap<sup>1</sup>, Grzegorz Cywinski<sup>2</sup>, D. B. But<sup>3</sup>, C. Consejo<sup>4</sup>, S. S. Krishtopenko<sup>5</sup>, N. Dyakonova<sup>4</sup>, A. M. Kadykov<sup>5</sup>, N. N. Mikhailov<sup>6</sup>, S. A. Dvoretiskii<sup>6</sup>, S. Ruffenach<sup>4</sup>, S. V. Morozov<sup>7</sup>, F. Teppe<sup>4</sup>

<sup>1</sup>University of Montpellier & CNRS / Polish Academy of Sciences, <sup>2</sup>Polish Academy of Sciences, <sup>3</sup>University of Montpellier & CNRS / Institute of Semiconductor Physics, <sup>4</sup>University of Montpellier & CNRS, <sup>5</sup>University of Montpellier & CNRS / Institute for Physics of Microstructures RAS, <sup>6</sup>Institute of Semiconductor Physics / Novosibirsk State University, <sup>7</sup>Institute for Physics of Microstructures RAS

### **Graphene and Dirac Materials Beyond Graphene: Applications in THz Metamaterials and Plasmonics**

Berardi Sensale-Rodriguez<sup>1</sup>

<sup>1</sup>University of Utah

### **High Performance Terahertz Radiation Sources Based on Plasmonic Photoconductors**

Mona Jarrahi<sup>1</sup>

<sup>1</sup>University of California Los Angeles

### **Photomixing mW THz Sources**

G. Ducournau<sup>1</sup>, P. Latzel<sup>1</sup>, F. Pavanello<sup>1</sup>, E. Peytavit<sup>1</sup>, M. Zaknoute<sup>1</sup>, J.-F. Lampin<sup>1</sup>

<sup>1</sup>IEMN

### **Laser-free THz Pulse Sources and Detectors in Silicon**

Aydin Babakhani<sup>1</sup>

<sup>1</sup>University of California Los Angeles

### **Chip-Scale Molecular Clock Using THz Rotational Spectroscopy**

Ruonan Han<sup>1</sup>

<sup>1</sup>Massachusetts Institute of Technology

### **Optically-Controlled Tunable/Reconfigurable Terahertz Devices for Advanced Sensing, Imaging and Communications**

L. Liu<sup>1</sup>, L.-J. Cheng<sup>2</sup>

<sup>1</sup>University of Notre Dame, <sup>2</sup>Oregon State University