



## **Commission Triennial Report**

### **Commission D**

This document provides the activity of Commission D during the triennium 2017-2021. Due to the COVID-19 pandemic the reporting period has been extended to cover the four year period from 2017 to 2021. The report includes the main international conferences and workshops that received technical sponsorship or financial support from the Commission. The report further provides an overview of the scientific program scheduled for the next General Assembly to be held in Rome, Italy, from August 28 - September 4, 2021.

## **1. Officers of Commission D**

During the period 2017-2021 the officers of Commission D are as follows:

### **Chair:**

Dr. Apostolos Georgiadis, Heriot-Watt University, Edinburgh, UK  
[apostolos.georgiadis@ieee.org](mailto:apostolos.georgiadis@ieee.org)

### **Vice Chair:**

Prof. Naoki Shinohara, Kyoto University, Kyoto, Japan  
[shino@rish.kyoto-u.ac.jp](mailto:shino@rish.kyoto-u.ac.jp)

### **Past Chair:**

Dr. Günter Steinmeyer, Max--Born--Institute, Berlin, Germany,  
[steinmey@mbi---berlin.de](mailto:steinmey@mbi---berlin.de)

### **Early Career Representatives:**

Dr. Arnaud Vena, Université Montpellier 2, France  
[arnaud.vena@ies.univ-montp2.fr](mailto:arnaud.vena@ies.univ-montp2.fr)  
Dr. Hossein Asghari, Loyola Marymount University, Los Angeles, USA  
[Mohammadhossein.Asghari@lmu.edu](mailto:Mohammadhossein.Asghari@lmu.edu)

## **2. Terms of Reference of Commission D**

The commission promotes research and reviews new developments in:

1. Electronic systems that push beyond current frontiers.
2. Microwave, millimeter wave and THz devices, circuits and systems
3. Nanotechnologies and nanoelectronics
4. Combined and hybrid photonic and electronic systems.
5. Photonic devices, systems, and their applications.
6. Photonic signal processing schemes, regardless of frequency of signal processed.



7. Optoelectronic systems, plasmonics, and electro-optics
8. Physics, theoretical modeling, and numerical simulation of all of the latter

The Commission focuses on electronics and photonics devices, circuits and systems for the purpose of implementing either previously inaccessible functionalities or of improving the performance of current electronic-only or photonic-only technologies.

### **3. Evolution of Topics and Future Planning in Commission D**

During the Business Meeting at GASS 2017 it was decided to focus efforts on attracting more interest on ground breaking topics in electronics and photonics fields and to foster collaboration with IEEE MTT-S.

Several action items were taken to organize activities in Commission D:

1. Focus on topics that unite electronics and photonics, e.g., optical telecommunications, terahertz waves, plasmonics, and metrology.
2. Invitation of world leading researchers to attend the URSI GASS.
3. Strengthen the relation with IEEE and specifically the IEEE MTT-S Society. Efforts led by Prof. Tatsuo Itoh and Prof. Ke Wu in order to formulate a sister society agreement which would involve all possible joint activities such as mutual sponsorship of conferences and joint publications.
4. Contribution from past Chairs of Commission D to URSI Centenary book.
5. Organization of 100 Year Anniversary of URSI Commission D session at GASS 2021 with invited presentations from past Commission D Chairs, following the initiative of past Chair, Prof. Smail Tedjini.

### **4. Supported Conferences and Workshops**

The Commission has received several requests for either technical or financial sponsorship. Each request has been considered and positively agreed when the topic of the event has connection with the terms of commission D.

In total 8 sponsorships have been delivered as follows:

1. Metamaterials 2021, 15th International Congress on Artificial Materials for Novel Wave Phenomena, New York, USA, 20-25 Sep. 2021, <https://congress.metamorphose-vi.org/>.
2. MAREW 2021, Microwave and Radio Electronics Week 2021, Brno, Czech Republic, 19-21 Apr. 2021, <https://www.marew.cz/>.
3. ISAP 2020, 2020 International Symposium on Antennas and Propagation, 25-28 Jan. 2021, Osaka, Japan, <https://www.ieice.org/cs/isap/2020/>



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4. Metamaterials 2020, 14th International Congress on Artificial Materials for Novel Wave Phenomena, <https://congress.metamorphose-vi.org/>.
5. 2019 IEEE RFID-TA, 10th IEEE International Conference on RFID Technology and Applications, 25-27 Sep. 2019, Pisa, Italy, <http://2019.ieee-rfidta.org/>.
6. URSI-JRSM 2019, 2019 URSI-Japan Radio Science Meeting, Sep 5-6, 2019, Tokyo, Japan, <http://www.ursi.jp/conference/jrsm2019>.
7. APMC 2018, Asia-Pacific Microwave Conference 2018, Nov. 6-9, 2018, Kyoto, Japan, <https://apmc-mwe.org/apmc2018/>.
8. ISAP 2018, 2018 International Symposium on Antennas and Propagation, Oct. 23-26 2018, Busan, Korea, <http://isap-2018.org>.

## 5. Flagship Conferences

Commission D participated in four flagship conferences, namely the AT-RASC in Gran Canaria, Spain in 2018, the AP-RASC in New Delhi, India in 2019, and the 33<sup>rd</sup> URSI-GASS in Rome, Italy in 2020 (cancelled due to COVID-19 pandemic) and the 34<sup>th</sup> URSI-GASS in Rome, Italy in 2021.

### 5a. AT-RASC

The conference was held in Gran Canaria, Spain in May 28 – June 1, 2018. There were a total of 87 papers in Commission D, arranged into 3 tutorial lectures, 75 oral presentations and a further 9 poster presentations. The table below includes an overview of the Commission D paper submission statistics.

There were three tutorial presentations scheduled. A first tutorial talk was delivered by Prof. Mona Jarrahi, University of California, Los Angeles, USA, on “Plasmonic Antennas for Advanced THz Imaging and Sensing”.

A second tutorial talk was delivered by Dr. Apostolos Georgiadis, Heriot-Watt University, UK, on “Energy Harvesting and Wireless Power Transfer for RFID and Wireless Sensors”.

A third tutorial talk was delivered by Dr. Hossein Asghari, Loyola Marymount University, USA, on “Optical real-time measurement techniques”.

Technical Topic	Number of papers
Tutorial	3
D06 Advances in ultrafast pulse characterization techniques: towards an optical oscilloscope	18
Electronics and Photonics	11



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Microwave Photonics	5
Plasmonics	10
Advances in radiative and non-radiative wireless power transfer	6
Wireless wearable devices for identification and sensing	9
Photonic Signal Processing, Real-time Instruments and Biomedical Imaging	9
GHz and THz Metrology	2
Advances in leaky wave antenna technologies	7
Printed electronics and novel materials for wireless devices and systems	7
TOTAL	87

### 5b. AP-RASC

The conference was held in New Delhi, India in March 9-15, 2019. There were a total of 76 papers in Commission D, arranged into 1 commission keynote lecture, 8 oral sessions comprising 47 papers and a further 29 poster presentations. The table below includes an overview of the Commission D paper submission statistics.

A Commission Keynote Lecture was delivered by Prof. Tadao Nagatsuma, Osaka University, Japan on “Terahertz-wave Applications Enabled by Photonics”.

Technical Topic	Number of papers
Commission Keynote	1
Electronic Systems Beyond Current Frontiers including Flexible, 3D and Inkjet-printed Electronics	1
Microwave, Millimeter Wave and THz Devices, Circuits and Systems	13
Electronics and Photonics for 5G and Beyond	1
Microwave and THz Photonics	13
Ultrafast Optics and Photonics	18



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Photonic Signal Processing, Real-time Instruments and Biomedical Imaging	8
Optoelectronic Systems, Plasmonics and Electro-optics	7
Wireless Power Transfer and Energy Harvesting	5
Wireless Devices and Sensors for Harsh Environments	1
DOS – Any Other Aspect of Electronics and Photonics	8
<b>TOTAL</b>	<b>76</b>

### 5c. URSI-GASS 2020 and 2021

The 33rd URSI General Assembly and Scientific Symposium URSI-GASS was originally scheduled to take place in Aug. 29 – Sep. 5, 2020 in Rome, Italy. There were a total of 145 accepted papers in Commission D. However, due to the COVID-19 pandemic it was decided to cancel the 2020 conference organization as a physical event. In view of a record overall number of submitted papers at the conference in all Commissions, it was decided to publish the proceedings of the 33rd URSI-GASS. Alternatively, the authors of accepted papers were given the option to submit their papers unchanged to the 34<sup>th</sup> URSI-GASS, where the papers would be considered automatically accepted.

The the 34th URSI General Assembly and Scientific Symposium URSI-GASS Conference is held in Rome, Italy in Aug. 28 - Sep. 4, 2021.

The original submission deadline of URSI-GASS 2021 was set to Jan. 31, 2021, subsequently extended to Feb. 12, 2021. There were a total of 139 accepted papers in Commission D which included 30 papers originally accepted for GASS 2020. The table below includes an overview of the Commission D paper submission statistics. The final distribution of the papers into sessions differed slightly from the table below in order to facilitate the organization of the overall technical program of the conference. Approximately 25% of the accepted papers were allocated as flash interactive presentations (FIPs) and the rest were distributed into oral sessions.

A tutorial talk will be given by Prof. Gaetano Marrocco, University of Rome, Tor Vergata, Italy, on “How state of the art RFID technology and research may help facing pandemics”.

Furthermore, an invited talk will be given by Prof. Federico Capasso, Harvard University, USA on “Metasurface Polarization Optics”, as part of the session on Metasurfaces-enabled polarisation control.

Technical Topic	Number of papers
Tutorial	1



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Photonic Signal Processing, Realtime Instruments & Biomedical Imaging	6
Near Field Wireless Power Transfer	7
Far-Field Wireless Power Transfer and Energy Harvesting	16
Substrate Integrated Circuit for 5G and Beyond	9
RFID and backscatter communication and sensing technologies	8
Antennas & electronics for wearable, epidermal & implantable devices	11
Chipless RFID	7
Integrated Terahertz Electronic and Photonic Devices and Systems	9
Microwave and photonic subsystems for Beyond 5G/6G communications	7
Plasmonics and metamaterials	12
100 Year Anniversary of URSI Commission D, electronics & photonics	7
Open session – Electronics and Photonics	8
Meas. and Instr. Technologies for mm and THz waves (with Commission A)	6
Metasurfaces-enabled polarisation control (with Commission B)	16
THz Communications (with Commission C)	3
Bio-effects and EM interference of wireless power transfer (with Commission K)	5
Wearable and Textile antenna for WBAN (with Commission K)	1
<b>TOTAL</b>	<b>139</b>

## 6. Working Groups within Commission D

### D.1 RFID Technologies and Privacy of Data

Chair: Dr. S. Tedjini (France); email : [smail.tedjini@lcis.grenoble-inp.fr](mailto:smail.tedjini@lcis.grenoble-inp.fr)

Vice-Chair: Dr. G. Marrocco (Italy); email: [marrocco@disp.uniroma2.it](mailto:marrocco@disp.uniroma2.it)