

Commission B Triennial Report 2021-2023

Prof. John Volakis

Chair Commission B

1. Commission B Activities (Terms of Reference)

Commission B is focused on fields and waves, encompassing theory, analysis, computation, experiments, validation and applications. Areas of emphasis are :

- Time-domain and frequency-domain phenomena;
- Scattering and diffraction;
- General propagation including waves in specialised media;
- Guided waves;
- Antennas and radiation;
- Inverse scattering and imaging.

The Commission fosters the creation, development, and refinement of analytical, numerical, and measurement techniques to understand these phenomena. It encourages innovation and seeks to apply interdisciplinary concepts and methods.

2. Commission B Officers

In the Board meeting of the International Union of Radio Science (URSI) during the General Assembly 2021 in Rome, the URSI Board approved the election of John L. Volakis as Chair, Henrik Wallen as the Vice-Chair, and Dimitrios C. Tzarouchis as the Early Career Representative of Commission B for the period 2021–2023.

The Commission B Officers for 2021–2023 are as follows:



Chair
John Volakis

Professor John Volakis
Dean, College of Engineering and Computing
Florida International University
10555 W. Flagler Street
Miami, FL 33174, USA
Email: jvolakis@fiu.edu



Vice-Chair
Henrik Wallen

Dr. Henrik Wallen
Department of Electronics and Nanoengineering
Aalto University School of Electrical Engineering
00076 Aalto, Finland
Email: henrik.wallen@aalto.fi



ECR 1
Andrea Michel

Dr. Andrea Michel
Department of Information Engineering
University of Pisa
Via G. Caruso, 16
I-56122 Pisa, Italy
Email: andrea.michel@unipi.it



ECR 2
Dimitrios C.
Tzarouchis

Dr. Dimitrios Tzarouchis
Senior Metamaterials R&D Engineer
Meta Materials Europe
Apostolou Pavlou 10a, 15123
Athens, Greece
Email: dtzarouc@gmail.com



Past Chair
Kazuya Kobayashi

Professor Kazuya Kobayashi
Department of Electrical, Electronic, and
Communication Engineering
Chuo University
1-13-27 Kasuga, Bunkyo-ku
Tokyo 112-8551, Japan
Email: kazuya@tamacc.chuo-u.ac.jp

2.1. Election of New Commission B Officers for 2023–2026

At the Commission B Coordination Activities Meeting to be held during GASS 2023 (Sapporo, Japan, August 19-26, 2023), the new Commission B Vice-Chair and ECR for 2023–2026 will be elected. We received the following nominations for Vice-Chair and ECR.

Vice-Chair Nominations

Tahsin Akalin (Assoc Professor), France
Taimoon Khan (Assoc Professor), India
Ludger Klinkenbusch (Professor), Germany

ECR Nominations

Dimitrios Tzarouchis (USA)----continues to 2nd 3-year term

Candidates for 1 position

Changjiang Deng (Assistant Professor), China
Satheesh Bojja Venkatakrisnan (Assistant Professor), USA

Voting will be finalized at GASS 2023 in August.

3. Editors for *URSI Radio Science Bulletin* and *URSI Radio Science Letters*

During this triennium (2021–2023), Henrik Wallen (Vice-Chair) and Dimitrios Tzarouchis (ECR2) served as Associate Editors for the *URSI Radio Science Bulletin* (RSB), while Andrea Michel (ECR 1) served as Associate Editor for the *URSI Radio Science Letters* (RSL).

Since January 1, 2023, Henrik Wallen is Editor-in-Chief of the *URSI Radio Science Letters*



4. Commission B Technical Advisory Board (B-TAB)

Commission B consists of

- Commission B Officers (Chair, Vice-Chair, two ECRs);
- Commission B Official Members (Commission B representatives from the URSI Member Committees);
- Commission B Technical Advisory Board (B-TAB),

among which the B-TAB was established in order to strengthen Commission B activities. The structure of the B-TAB is the following (as of May 11, 2023):

Albani	Matteo	Italy, matteo.albani@dii.unisi.it
Ando	Makoto	Japan, mando@antenna.ee.titech.ac.jp
Andriulli	Francesco	Italy, francesco.andriulli@polito.it
Boag	Amir	Israel, boag@eng.tau.ac.il
Campione	Salvatore	USA, sncampi@sandia.gov
Chatterjee	Deb	USA, ChatD@umkc.edu
Eibert	Thomas	Germany, eibert@tum.de
Eleftheriades	George	Canada, gelefth@waves.utoronto.ca
Enggheta	Nader	USA, enggheta@ee.upenn.edu
Gürel	Levent	Turkey, lgurel@gmail.com
Hagness	Susan	USA, susan.hagness@wisc.edu
Heyman	Ehud	Israel, heyman@eng.tau.ac.il
Hirokawa	Jiro	Japan, jiro@antenna.ee.titech.ac.jp
Jackson	David	USA, djackson@uh.edu
Klinkenbusch	Ludger	Germany, lbk@tf.uni-kiel.de
Kobayashi	Kazuya	Japan, kazuya_k@sea.plala.or.jp
Kristensson	Gerhard	Sweden, gerhard.kristensson@eit.lth.se
Li	Lianlin	China, lianlin.li@pku.edu.cn
Manara	Giuliano	Italy, giuliano.manara@iet.unipi.it
Michel	Andrea	Italy, andrea.michel@iet.unipi.it
Nepa	Paolo	Italy, paolo.nepa@iet.unipi.it
Ohnuki	Shinichiro	Japan, ohnuki.shinichiro@nihon-u.ac.jp
Pastorino	Matteo	Italy, matteo.pastorino@unige.it
Rahmat-Samii	Yahya	USA, rahmat@ee.ucla.edu
Rengarajan	Sembiam	USA, srengarajan@csun.edu
Schettini	Giuseppe	Italy, giuseppe.schettini@uniroma3.it
Shafai	Lotfollah	Canada, Lot.Shafai@umanitoba.ca
Shestopalov	Yury	Sweden, Yury.Shestopalov@hig.se
Sihvola	Ari	Finland, ari.sihvola@aalto.fi
Sjöberg	Daniel	Sweden, daniel.sjoberg@eit.lth.se
Smith	Paul	Australia, paulsmith2468@gmail.com
Su	Donglin	China, sdl@buaa.edu.cn
Uslenghi	Piergiorgio L. E.	USA, uslenghi@uic.edu
Volakis	John	USA, jvolakis@fiu.edu
Wallén	Henrik	Finland, henrik.wallén@aalto.fi



Wilton	Don	USA, wilton@uh.edu
Zaghloul	Amir	USA, amirz@vt.edu
Ziolkowski	Richard	Australia, Richard.Ziolkowski@uts.edu.au
Dimitrios	Tzarouchis	USA/Greece, dtzarouc@gmail.com

5. Commission B Conferences

During this triennium, the URSI AT-RASC and the URSI AP-RASC flagship conferences were merged into the 3rd URSI Atlantic/Asia Pacific Radio Science Meeting 2022 (URSI AT-AP-RASC 2022), May 29 – June 2, 2022, Gran Canaria, Spain. Moreover,

Commission B contributed significantly to the success of all these conferences.

5.1. URSI AT-AP-RASC 2022

The 3rd URSI Atlantic/Asia Pacific Radio Science Meeting 2022 (URSI AT-AP-RASC 2022) was held at ExpoMeloneras Convention Centre, Gran Canaria, Spain on May 29 – June 2, 2022. Conference proceedings are available online at the following link <https://www.ursi.org/proceedings/procAT22/ATAPRASC2022-program.html#B01-1>.

Commission B had 214 accepted papers, organized into the 71 slots of the 26 regular sessions and 4 joint sessions.

Below are the sessions led by Commission B.

Regular Comm B Session

Session	Session Title	Conveners	# of paper (approximate)
B01	Antenna theory, design, and measurement	Debatosh Guha D. Tzarouchis Andrea Michel	28
B02	Simultaneous transmit receiver front ends	Elias Alwan Satheesh Bojja Venkatakishnan John L. Volakis	4
B03	Propagation and scattering: advances, trends and new applications	Robert Burkholder Danilo Erricolo Guido Lombardi	7
B04	Advanced algorithms in computational electromagnetics	Shinichiro Ohnuki Vladimir Okhmatovski Qing Huo Liu	18
B05	Antennas and microwave imaging for biomedical applications	Asimina Kiourt Emily Porter	4
B06	Inverse scattering and imaging	Matteo Pastorino Shouhei Kidera Raffaele Solimene	9

		Andrea Randazzo	
B07	Integral equation, hybrid, and fast methods	Shanker Balasubramaniam Amir Boag	9
B08	Mathematical methods in electromagnetics	Kazuya Kobayashi Yury Shestopalov	9
B09	Mathematical modelling of EM problems	Paul Smith Piergiorgio L. E. Uslenghi	10
B10	Scattering and diffraction	Ludger Klinkenbusch Giuliano Manara	9
B11	Electromagnetic theory	Henrik Wallén Daniel Sjöberg	10
B12	Materials in electromagnetics	Andrey Osipov Paul Smith	7
B13	Waves in nonlinear and inhomogeneous media	Yury Shestopalov Eugen Smolkin	3
B14	Quantum techniques for Electromagnetics	Amir Boag Andrea Alu Alex Krasnok	11
B15	Additive Manufacturing, Novel composites and Metastructures	Karu Esselle Gokhan Mumcu Ladislau Matekovits Simone Genovesi	9
B16	Machine Learning, Artificial Intelligence, and Novel Optimization Techniques in Electromagnetics	Sembiam Rengarajan Christos Christodoulou	3
B17	Millimeter-wave antennas/5G communications	Elias Alwan Satheesh Bojja Venkatakrisnan Jiro Hirokawa	11
B18	Women of Radio Science Contributions	Martina Teresa Bevacqua Reyhan Baktur Rosa Scapatucci Maria Antonia Maisto	3
B19	High-frequency and hybrid methods	Giuliano Manara Ludger Klinkenbusch Prabhakar Pathak	3
B20	Vehicular and automotive RF links	Daniel Aloï Christoph Mecklenbraeuer Andrea Michel	2
B21	Metamaterial concepts for electromagnetics	Andrea Alù Nader Engheta Dimitrios Sounas	12
B22	RF front ends with MIMO	Arjuna Madayanake Yahia M. M. Antar	1



B23	Electromagnetic methods for direct and inverse scattering involving stratified media	Matteo Pastorino Giuseppe Schettini Cristina Ponti	5
B24	Terahertz Antenna Systems	Kubilay Sertel Filippo Costa	5
B25	Foldable Antennas and Antennas for CubeSats	Reyhan Baktur Stavros Georgakopoulos Simone Genovesi	4
	Reconfigurable Intelligent Surfaces		
B26	Open session	John Volakis Henrik Wallen	10

Joint Sessions

BE	Near-field coupling in wireless communications	Paolo Nepa (Comm B) Gabriele Gradoni (Comm E) Andrea Michel (Comm B)	3
BC	OFDMs and wideband communications	Amir Zhaghoul (Comm B and C) Yves Louet (Comm C) Satheesh Bojja Venkatakrisnan (Comm B) Brian Sadler	1
BK	AI/ML applications to biomedical technologies	Asimina Kiourti (Comm B) Cecilia Occhiuzzi (Comm C)	3

During the URSI AT-AP-RASC 2022, the 2022 URSI School for Young Scientists was been organized on Sunday, 29 May 2022, entitled “RFIDs: A wireless technology enabling new communications and sensing paradigms”. Speakers: Prof. Smail Tedjini (Université Grenoble-Alpes, France) and Prof. Simone Genovesi (University of Pisa, Italy).

5.2. URSI EMTS 2023

The International Symposium on Electromagnetic Theory (EMTS 2023) will be held from 23-26 May 2023 at the University of British Columbia in Vancouver, BC, Canada. The website link is <https://www.emts2023.org/>. A total of 235 paper were accepted.



2023 URSI Commission B Symposium on Electromagnetic Theory (EMTS 2023)																						
Tuesday		Wednesday					Thursday					Friday										
8:00	2023 URSI Commission B School for Young Scientists	Registration	Exhibition	Opening Ceremony					Registration					Registration								
8:20				B1	C1	D1	E1	F1	B4	C4	D4	E4	F4		B9	C9	D9	E9	F9			
8:40				4	4	4	4	4	7	7	7	7	7		7	7	7	7	7			
9:00				Coffee Break					Coffee Break						Coffee Break							
9:20				General Lecture 1 XXX YYY					General Lecture 2 XXX YYY						General Lecture 3 XXX YYY							
9:40				Lunch					Lunch						Lunch							
10:00				2023 URSI Commission B School for Young Scientists	Registration	Exhibition	B2	C2	D2	E2	F2	B5	C5		D5	E5	F5	B10	C10	D10	E10	F10
10:20							7	7	7	7	7	6	6		5	5	6	7	7	7	7	7
10:40							Coffee Break					Coffee Break					Coffee Break					
11:00							Commission B Business Meeting I					Commission B Business Meeting II										
11:20	Young Scientists Reception (invitees only)						Welcome Reception					Conference Banquet										
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- General Track #01: Electromagnetic Theory
- General Track #02: Computational methods
- General Track #03: Materials and wave-material interaction
- General Track #04: Antennas and Propagation
- General Track #05: Other Topics
- General Track #01: Electromagnetic Theory
- General Track #02: Computational methods
- General Track #03: Materials and wave-material interaction
- General Track #04: Antennas and Propagation
- General Track #05: Other Topics
- Special Session #01: Novel Electrically Small and Multifunctional Antennas
- Special Session #02: Electromagnetic Sensors for Chemical and Biological Applications
- Special Session #03: Advances in Electromagnetic Imaging Algorithms and Systems
- Special Session #03a: Advances in Electromagnetic Imaging Algorithms and Systems
- Special Session #04: Advanced algorithms of CEM
- Special Session #05: Advances in Theory and Applications of Metasurfaces
- Special Session #06: Millimeter-waves for future wireless communication systems
- Special Session #07: Periodic structures in applied electromagnetics
- Special Session #08: Advances in the Methods of Inverse Scattering and Real-time Imaging with Microwaves and Millimeter Waves.
- Special Session #09: CAD tools for EM



- Special Session #10: Reconfigurable RF Devices & Circuits
- Special Session #11: Novel Mathematical Methods in Electromagnetics
- Special Session #12: Scattering and Diffraction
- Special Session #13: Wave Phenomena in non-LTI Media
- Special Session #14: Electromagnetic theory
- Special Session #15: Artificial intelligence, machine learning and nature inspired optimization techniques in electromagnetics
- Special Session #16: Theoretical advances in electromagnetic metamaterials
- Special Session #17: Advances in Remote Sensing and Applied Electromagnetics for Climate Change Research
- Special Session #18: RISs and Reconfigurable Electromagnetic Surfaces
- Special Session #19: Theory and applications of characteristic modes
- Special Session #20: Metamaterial-inspired extreme electromagnetics: Scattering and radiating structures and their applications
- Special Session #21: Multifunctional antennas and arrays for satellite and wireless communications
- Special Session #22: Recent Antenna Applications and Advancements for Satellite, Radar, Air and Ground Systems
- Special Session #23: Wave guiding and scattering by cylindrical metasurface and metamaterial structures
- Special Session #24: Materials in electromagnetics
- Special Session #25: Modelling and Measurement of Antennas and Propagation for 5G and 6G Applications
- Special Session #26: Mathematical Modelling of EM problems
- Special Session #27: Substrate Integrated Waveguide Techniques and Applications

5.3. URSI GASS 2023

The following sessions have been organized by Comm B at the GASS 2023 to be held in Sapporo, Japan, Aug 17 to 26, 2023. The listed names refer to the co-conveners

The number of papers are as follows: Total URSI papers(initial count): 316 (251 oral, 39 poster, 16 online). Some of the papers planned for oral moved to online or pre-recorded.

1. **Electromagnetic theory**
Henrik Wallén henrik.wallén@aalto.fi
Daniel Sjöberg, daniel.sjöberg@eit.lth.se
2. **Antenna theory, design, and measurements**
Andrea Michel, andrea.michel@unipi.it
Debatosh Guha, dgirpe@yahoo.co.in
Silvio Hrbar, Silvio.Hrbar@fer.hr
3. **Scattering and diffraction**
Ludger Klinkenbusch, lbk@tf.uni-kiel.de
Giuliano Manara, giuliano.manara@iet.unipi.it



4. **High-frequency and hybrid methods**
Robert Burkholder, burkholder.1@osu.edu,
Prabhakar Pathak, pathakph@gmail.com,
Giuliano Manara, giuliano.manara@iet.unipi.it
5. **Electromagnetics of time-varying scatterers and materials**
Hakan Bagci, hakan.bagci@kaust.edu.sa
Viktar Asadchy, viktar.asadchy@aalto.fi
Dan Jiao, djiao@purdue.edu,
6. **Propagation and scattering: advances, trends and new applications**
Danilo Erricolo derric1@uic.edu,
Lombardi Guido, guido.lombardi@polito.it,
Robert Burkholder, Burkholder.1@osu.edu
7. **Advanced algorithms in computational electromagnetics**
Shinichiro Ohnuki, ohnuki.shinichiro@nihon-u.ac.jp
Vladimir Okhmatovski, Vladimir.Okhmatovski@umanitoba.ca
Qing Huo Liu, qhliu@duke.edu
8. **Mathematical methods in electromagnetics**
Kazuya Kobayashi kkobayashi001q@g.chuo-u.ac.jp,
Yury Shestopalov Yury.Shestopalov@hig.se,
Martina Bevacqua, martina.bevacqua@unirc.it
Santi Pavone, santi.pavone@unict.it
9. **Machine Learning and Optimization Techniques in Electromagnetics: new trends and novel applications**
Sembiam R. Rengarajan, sembiam.rengarajan@csun.edu
Ahmad Hoorfar, ahmad.hoorfar@villanova.edu,
Christos Christodoulou, christos@unm.edu
10. **Integral equation, hybrid, and fast methods**
Amir Boag, boag@tauex.tau.ac.il,
Shanker Balasubramaniam, shanker.32@osu.edu ,
Thomas Eibert eibert@tum.de
11. **Inverse scattering and imaging**
Matteo Pastorino, matteo.pastorino@unige.it,
Shouhei Kidera, kidera@ee.uec.ac.jp,
Raffaele Solimene, Raffaele.SOLIMENE@unicampania.it,
Andrea Randazzo, Andrea.Randazzo@unige.it
12. **Electromagnetic methods for direct and inverse scattering involving stratified media**
Matteo Pastorino, matteo.pastorino@unige.it,
Giuseppe Schettini giuseppe.schettini@uniroma3.it,
Cristina Ponti cristina.ponti@uniroma3.it
13. **Mathematical modelling of EM problems**
Paul Smith, paulsmith2468@gmail.com ,
George Uslenghi, uslenghi@uic.edu
14. **Materials in electromagnetics**
Andre Osipov, andre.osipov@dlr.de,
Paul Smith, paulsmith2468@gmail.com
15. **Metamaterial concepts for electromagnetics**



- Dimitrios Sounas, dsounas@wayne.edu,
Andrea Alù, aalu@gc.cuny.edu,
Dimitrios Tzarouchis, dtz@seas.upenn.edu
16. Waves in nonlinear and inhomogeneous media
Yury Shestopalov, Yury.Shestopalov@hig.se,
Eugene Smolkin, e.g.smolkin@hotmail.com
17. Innovations in electromagnetics and photonics
Christos Argyropoulos, christos.argyropoulos@unl.edu
Dimitrios Sounas, dsounas@wayne.edu
Pai-Yen Chen, pychen@uic.edu
18. Quantum techniques for electromagnetics
Amir Boag, boag@tauex.tau.ac.il,
Alex Krasnok, akrasnok@fiu.edu,
Paolo Rocca, paolo.rocca@unitn.it,
19. Nanoscale Electromagnetics: Theory and Applications
Dimitrios Tzarouchis, dtz@seas.upenn.edu,
Pacheco-Peña, victor.pacheco-pena@ncl.ac.uk
Filipa Prudêncio, filipa.prudencio@lx.it.pt
20. Women of Radio Science Contributions
Maria Antonia Maisto, MariaAntonia.MAISTO@unicampania.it,
Reyhan Baktur, reyhan.baktur@usu.edu
Dan Jiao, djiao@purdue.edu
21. Theory and applications of characteristic modes
Henrik Wallén, henrik.wallén@aalto.fi,
Pasi Ylä-Oijala, pasi.yla-oijala@aalto.fi
22. Additive Manufacturing, Novel composites and Metastructures
Eduardo Rojas, Eduardo.Rojas@erau.edu,
Satheesh Bojja Venkatakrishnan, sbojjave@fiu.edu
Karu Esselle, karu@ieee.org
23. Millimeter-wave antennas/5G communications and beyond
Jiro Hirokawa, jiro@ee.e.titech.ac.jp
Elias Alwan, ealwan@fiu.edu
24. MIMO channel links and RF front ends
Debdeep Sarkar, debdeep@iisc.ac.in
Arjuna Madayanake, amadanay@fiu.edu
25. Vehicular and automotive RF links
Andrea Michel, andrea.michel@unipi.it
Daniel Aloj, aloi@oakland.edu
Christoph Mecklenbraeuer, christoph.mecklenbraeuer@tuwien.ac.at
26. Foldable Antennas and Antennas for CubeSats
Satheesh Bojja Venkkrishnan, sbojjave@fiu.edu,
Stavros Georgakopoulos, georgako@fiu.edu,
Simone Genovesi, simone.genovesi@unipi.it
27. Duplex/Simultaneous transmit-receive RF front ends
Satheesh Bojja Venkatakrishnan, sbojjave@fiu.edu
John L. Volakis, jvolakis@fiu.edu
Debdeep Sarkar debdeep@iisc.ac.in



28. Stochastic methods and machine learning for electromagnetics

Steven Mark Anlage, anlage@umd.edu

Raphaël Pestourie, pestourie@alumni.harvard.edu

29. Reconfigurable Intelligent Surfaces (RIS) and their Applications

Fu Liu, fu.liu@xjtu.edu.cn

Filippo Costa, filippo.costa@unipi.it

30. Open Session

John Volakis, jvolakis@fiu.edu

Henrik Wallen, henrik.wallen@aalto.fi

Joint Sessions

31. **BK: AI/ML applications to biomedical technologies**

Asimina Kiourti, Kiourti.1@osu.edu (Comm B)

Cecilia Occhiuzzi cecilia.occhiuzzi@uniroma2.it (Comm C)

32. **BC: Integrated communications, sensing and computing for beyond-5G communications**

Andrea Michel (University of Pisa, Italy) - Commission B (andrea.michel@unipi.it)

Giacomo Bacci (University of Pisa, Italy) - Commission C (giacomo.bacci@unipi.it)

33. **BK: Innovative antennas for biomedical applications**

Asimina Kiourti, Kiourti.1@osu.edu

Erdem Topsakal, etopsakal@vcu.edu

Emily Porter, emily.e.porter@ieee.org

34. **BE: Near-field RF links for communications and sensing**

Gabriele Gradoni, gabriele.gradoni@nottingham.ac.uk

Paolo Nepa, paolo.nepa@unipi.it

Andrea Michel, andrea.michel@iet.unipi.it

35. **BD Wireless technologies for extreme environments**

Simonne Genovesi, simone.genovesi@unipi.it

Valentina Palazzi, valentina.palazzi@unipg.it

Giuliano Manara, giuliano.manara@unipi.it

36. **KB: Electromagnetic/optical imaging and sensing for biomedical applications**

Puyan Mojabi, Puyan.Mojabi@umanitoba.ca

Shouhei Kidera, kidera@ee.uec.ac.jp

Satheesh Bojja Venkatakrisnan, sbojjave@fiu.edu

Erdem Topsakal, etopsakal@vcu.edu

37. **ABF: Deep learning in Artificial Electromagnetic Materials**

Willie Padilla, Comm F, willie.padilla@duke.edu

Dimitrios Tzarouchis, dtz@seas.upenn.edu

5.4. EMTS 2025

Proposals from Italy and from Greece were presented at the Vancouver EMTS 2023.

These presentations will be sent to the Commission B Chairs for a vote to be conducted prior to the GASS 2023 conference.



6. URSI Commission B School for Young Scientists at EMTS 2023

Over 40 young scientists applied to EMTS 2023. Of these, 16 were selected for travel support to Vancouver (however, Visa issues reduced the number to 14 on site YSAs).

YSA Course Details:

Course Details: Analysis/Synthesis of Large Conformal Phased Arrays and Ultra-Wideband Arrays for Some Modern Antenna Applications

Course Schedule: Tuesday, May 23, 8:30 -12:30 and 14:30 -16:30

URSI EMTS 2023, University of British Columbia, Vancouver, CANADA

Course ABSTRACT

The analysis/synthesis of electrically large phased array antennas is a challenging problem. For instance, if one is interested in analyzing a phased array with hundreds or even thousands of antenna elements placed conformally on a large aerospace platform, then it becomes necessary to solve a very large number of unknowns via a conventional numerical method of solution to this problem, wherein the mutual coupling between the antenna elements of the array, as well as the wave interactions between the large array and its complex platform, are all accounted for in a self consistent manner. Such a method can thus become rapidly cumbersome and possibly even intractable. On the other hand, at moderate to high frequencies, ray methods based on the uniform geometrical theory of diffraction (UTD), offer an attractive alternative for the analysis/synthesis of a large array on a large platform. A UTD concept will therefore be introduced and carefully developed to treat conformal antenna phased arrays on fairly realistic structures, e.g., on an aircraft fuselage, as well as in a relatively efficient and tractable fashion. More importantly, this UTD provides a physical picture of the array wave radiation mechanisms in terms of rays launched from the antenna array elements. These rays subsequently interact with the platform via diffraction at curved surfaces, edges, corners, etc. of the platform. Such a direct physical insight is generally not available from other methods. Hence, the UTD can provide valuable information to the array design engineer as to how complex platforms affect the amplitude, phase and polarization performance of an array. An example will be illustrated where an antenna array is placed conformally on a smooth convex structure, and designed to scan at a given direction. Mutual coupling between antenna array elements are also included in this UTD procedure. Further refinements to the UTD procedure for complex conformal array geometries, e.g., arrays recessed just below the skin of the platform and/or covered by a radome are possible. These refinements are based on a hybrid combination of numerical and UTD methods which will be outlined only briefly. Additional specific phased array designs for ultra-wide band (UWB) applications will be considered. Practical examples will be shown in the context of new antenna systems for the most recent 5G wireless networks and beyond.

SYLLABUS

1. Introduction on analysis/synthesis of large conformal antenna phased arrays (1/2 hour)
2. Introduction to the UTD ray method in treating large conformal antenna phased arrays (2 hours)
3. Application of UTD to analyze a conformal antenna array phased to scan in a desired direction (2 hours)
4. Outline of future directions in the analysis/synthesis of more complex phased array geometries via hybridization of numerical and UTD methods (1/2 hour)
5. On the design of UWB antenna arrays for modern 5G applications (1 hour)

Total time = 6 hours.

Course Instructors: Prabhakar Pathak, Giuliano Manara, and John Volakis.

Approximately 30 YSA applicants were proposed were evaluated by an appointed committee.

The committee is listed below:



Yahia Antar, Canada antar-y@rmc.ca;

Jiro Hirokawa, Japan Available only for the 1st evaluation jiro@antenna.ee.titech.ac.jp

Ludger Klinkenbusch, Germany lbk@tf.uni-kiel.de

Kazuya Kobayashi, Japan kazuya_k@sea.plala.or.jp

Giuliano Manara, Italy giuliano.manara@iet.unipi.it

Andrea Michel, Italy andrea.michel@iet.unipi.it

David Michelson, Canada president@ursi.ca

Sembiam Rengarajan, USA (Chair) sembiam.rengarajan@csun.edu

Yury Shestopalov, Sweden Yury.Shestopalov@hig.se

Ari Sihvola, Finland ari.sihvola@aalto.fi

Daniel Sjöberg, Sweden daniel.sjoberg@eit.lth.se will participate in the first evaluation. Not sure about the second.

Paul Smith, Australia paulsmith2468@gmail.com

Sergei Tretyakov, Finland sergei.tretyakov@aalto.fi

Dimitrios Tzarouchis, USA dtz@seas.upenn.edu

Henrik Wallen, Finland henrik.wallen@aalto.fi

The committee selected the following applicants for honorable mention, who received partial travel support, hotel accommodations and free registration for this event. The EMTS conference chair received 9,000 Euros towards this activity. The selected honorable mention applicants were: Thomas E. Roth, Mariana Dalarson, J. Enrique Vazquez-Lozano, Xingqi Zhang, Matthias M. Saurer, Adrien Merlini, Boyuan Zhang, Rotem Gal-Katzir, Melany Gutierrez Hernandez, Francesco Alessio Dicandia, Cristina Origlia, Martina Teresa Bevacqua, Mostafa Movahediqomi, Mario Phaneuf, Gaurangi Gupta, Hajar Abedifirouzjaei. These candidates also participated in a poster competition. The winners of the poster competition were

First Prize: US\$1000 Thomas E. Roth

Second Prize: US\$750 Mariana Dalarsson

Third Prize: \$250 each Adrien Merlini
Matthias Saurer

Honorable Mention:

Martina Teresa Bevacqua

Cristina Origlia

Boyuan Zhang

7. Commission B Budget Status

The budget below shows a balance of 7601.71 Euros. This balance includes some of the encumbrances for travel support to GASS 2023 in Sapporo. Encumbrances from the ERCs are still pending.



Commission B Budget: 2021-2023

25,850.00 €

actual

	AT-AP-RASC	GASS	EMTS	Total
Chair John L. Volakis	575.00 €	2,780.00 €	0.00 €	3,355.00 €
Vice-Chair Henrik Wallén	1,251.20 €	2,780.00 €	0.00 €	4,031.20 €
ECR1 Andrea Michel	0.00 €	0.00 €	0.00 €	0.00 €
ECR2 Dimitrios C. Tzarouchis	1,862.09 €	0.00 €	0.00 €	1,862.09 €
EMTS 2023	0.00 €	0.00 €	9,000.00 €	9,000.00 €
	3,688.29 €	5,560.00 €	9,000.00 €	18,248.29 €

Balance:

7,601.71 €

hotel 215 Euro/day
 reg fee 665 Euro
 per diem 20 Euro/day

8. Meetings supported by Commission B

Commission B provided technical support to various international conferences during 2021-2023 as shown in the following table:

May 2023	America	Vancouver, BC, Canada	22-26 May 2023	EMTS 2023
November 2022	Asia	Yokohama, Japan	29 November - 2 December 2022	APMC 2022
December 2022	Asia	Indore, MP, India	1-4 December 2022	RCRS 2022 - Regional Conference on Radio Science
October 2022	Oceania	Sydney, Australia	31 October - 3 November 2022	ISAP 2022
September 2022	Africa	Cape Town, South Africa	5-9 September 2022	ICEAA - IEEE APWC
September 2022	Europe	Malaga, Spain	5-7 September 2022	URSI Malaga 2022
September 2022	Asia	Tokyo, Japan	1-2 September 2022	URSI-JRSM - 2022 URSI-Japan Radio Science Meeting
July 2022	Europe	Athens, Greece	16-24 July 2022	44th COSPAR General Assembly
May 2022	Europe	Gran Canaria, Spain	29 May - 3 June 2022	AT-AP-RASC 2022



March 2022	Europe	Madrid, Spain	27 March - 1 April 2022	EuCAP 2022 - 16th European Conference on Antennas and Propagation
December 2021	Asia	Marina Bay Sands, Singapore	04-10 December 2021	2021 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting
November 2021	Europe	Leiria, Portugal	24 November 2021	15th Congress of the Portuguese Committee of URSI
October 2021	Europe	Prague, Czech Republic	20 October 2021	Czech National Committee Radio Science Workshop
October 2021	Asia	Taipei, Taiwan	19-22 October 2021	ISAP 2021
September 2021	Europe	Miltenberg, Germany	28-30 September 2021	Kleinheubacher Tagung 2021
September 2021	online	Hacettepe and Gebze, Turkey	7-9 September 2021	URSI-Turkey National Committee 10th Scientific Congress and General Meeting
recurrent	online	Czech Republic	every 2 weeks	Bioelectrodynamics Webinars