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Sihvola, Ari  
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# EMTS 2016 Conference in Espoo, Finland

**A**long with the URSI General Assembly, the other main meeting within Commission B is its own triennial Electromagnetic Theory Symposium (EMTS). The EMTS2016 conference was organized on the campus of Aalto University in Espoo, Finland, in August 2016. The conference gave an all-embracing view of the present state of research on fields and waves in radio science.

Radio science covers the study, understanding, and application of electromagnetics and electronics in natural and manmade environments. The impact and importance of radio science for modern technology and society cannot be overstated. Telecommunications, nanotechnology, radio astronomy, and remote sensing for monitoring of the environment and global change are but some of the fields that rest on the foundations of radio science.

As the Chair of Commission B of URSI, I could even go further and claim that the foundations of radio science rest on electromagnetics – the study of fields and waves – which is the domain of Commission B of URSI!

In addition to the General Assemblies, Commission B activities triennially culminate in the electromagnetic theory conferences. The tradition of the Electromagnetic Theory Symposium (EMTS) is impressive. It spans a history of over 60 years. The first gathering was in Toronto, Canada, in 1953. The year 2016 marked the twenty-second time the conference was held, this time in Espoo, Finland. EMTS2016 took place on the campus of Aalto University on August 15-18, 2016.

During the four days of the conference (see the visual design shown in Figure 1), a full output in electromagnetics of radio science was offered. The program of EMTS2016

consisted of 49 technical sessions, two poster sessions, and four plenary talks. The technical content of the meeting concentrated on fundamental and theoretical aspects of electromagnetics, from both the analytical and computational points of view. Examples of approaches were scattering and diffraction, high-frequency and beam methods, transformation optics, and boundary problems involving random media. However, several application areas were also covered, such as on-body antennas and metamaterials.

The 261 papers submitted to the conference were evaluated by the review board, which consisted of 60 experts in electromagnetics. On average, a single submission received 2.3 reviews. The final program included 247 presentations. Of course, EMTS2016 was a perfect platform for scientific interactions after the presentations (Figure 2) and during coffee breaks (Figure 3).

The amount of no-shows was pleasingly low: there were only four accepted contributions that were not presented onsite. It was also encouraging that many of our Turkish colleagues were able to participate, despite the tense political situation in their country in the summer of 2016. Altogether, 228 participants and 21 accompanying persons attended the EMTS2016 conference. They came from 30 different countries. All contributions that were presented in EMTS2016 have now been published on IEEE Xplore.

In addition to the contributed presentations, each day of the conference included a one-hour plenary talk. The talks covered the scope of Commission B, from theory through computations to engineering physics (video recordings of three of the plenary talks are available on the conference Web site at <http://www.emts2016.org/>):



**Figure 1.** The logo of EMTS2016 consisted of equipotential contours of electrically charged monopole constellations.



**Figure 2.** Friedrich Hehl is shown making his point during the discussion period of the session on the history of electromagnetics (photo: Viktor Asadchy).



**Figure 3.** As usual in conferences, coffee breaks were scenes of intensive technical discussions. Ludger Klinkenbusch (r) tried to convince Ari Sihvola that exact solutions exist for wave diffraction from cones and wedges (photo: Viktor Asadchy).

- Prof. Friedrich W. Hehl (Universität zu Köln, Germany), “Generally Covariant Maxwell Theory for Media with a Local Response: Progress Since 2000”
- Prof. Mats Gustafsson (Lund University, Sweden), “Stored Energy and Antenna Current Optimization”
- Prof. Mário G. Silveirinha (University of Lisbon, Instituto Superior Técnico, Portugal), “Topological Photonics in a Continuum”
- Prof. Jin-Fa Lee (Ohio State University, USA), “Computational Electromagnetics – Past, Present, and The Future”

In the best of URSI traditions, a strong emphasis was put on young scientists. 20 Young Scientist Awardees (YSAs) were selected from 43 applicants. These YSAs were given free registration to the conference, free accommodations, and banquet tickets. One of the poster sessions of EMTS was dedicated to these young scientists, who also gave a poster presentation in addition to their talk in one of the oral sessions.

Based on the submitted summaries and poster presentations, the Young Scientist Program Committee of EMTS2016, chaired by Kazuya Kobayashi, awarded three YS best paper prizes. These were given to Simon B. Adrian (Technical University of Munich, Germany, and Télécom Bretagne, France; 1000€); Marko Mikkonen (Aalto University, Finland; 750€); and Alberto Favaro (Imperial



**Figure 4, Not only radio science: outside activities of Young Scientists during the URSI Commission B School for Young Scientists (photo: Henrik Wallén).**

College, UK; 500€). Honorary mention was conferred on Dmitry Valovik (Penza State University, Russia) and Xiaoyan Xiong (The University of Hong Kong).

Commission B also continued the tradition of Young Scientist Schools. On Sunday, August 14, before the main conference, the 2016 URSI Commission B School for Young Scientists took place in the Finnish Nature Centre Haltia in the Nuuksio National Park. The topic of this short course was “Electromagnetic Fields and Waves: Mathematical Models and Numerical Methods.” The course instructor was Prof. Yury Shestopalov, assisted by Dr. Eugen Smolkin, both from University of Gävle (Sweden). During the day, besides electromagnetics, the 31 participants also enjoyed the wild nature of rural Espoo during the afternoon outside activities, as can be seen in Figure 4.

Expanded contributions of selected presentations in the conference will be published in the “Special Issue of the 2016 URSI International Symposium on Electromagnetic Theory” in the journal *Radio Science*. In addition, the *Radio Science Bulletin* will honor the prize-winning young scientists, who have been invited to write follow-up articles on their research, to appear in a forthcoming issue.

If you missed EMTS2016, don’t worry: the next EMTS event is in preparation. I hope to see you in May 2019 for EMTS2019 in San Diego, California!

Ari Sihvola  
Chair, EMTS2016 Conference  
Department of Radio Science and Engineering,  
Aalto University, Finland  
E-mail: ari.sihvola@aalto.fi