



# Commission A

## 2008-2011 Triennial Report

*(Chair: Dr P. Banerjee Vice Chair: Dr. W. Davis)*

**In the triennium 2008-2011, Commission A** has been active through the following events. Commission A deals with a wide range of scientific activities covering measurement related issues in all electrical and electronics parameters, components and devices.

New terms of reference were worked out to make them quite relevant to emerging developments and strategies. This is also aimed at to make the commission activities more relevant to the society and to stimulate more participants. Terms of reference of Commission A has been modified in the last GA 2005. But afterward a through review has been made through various discussions and the new terms of reference have emerged.

The commission promotes research and development of the field of measurement standards and physical constants, calibration and measurement methodologies, improved quantification of accuracy, and traceability, and the inter-comparison of such. Areas of emphasis are:

- (a) the development and refinement of new measurement techniques and calibration of standards
- (b) primary standards, including those based on quantum phenomena, and the realization and dissemination of time and frequency standards
- (c) characterization of the electromagnetic properties of materials, physical constants, and the properties of engineered materials, including nanotechnology
- (d) methodology of electromagnetic dosimetry and measurements for health diagnostics, applications, and biotechnology: including biosensing
- (e) measurement validity in advanced communication systems and other applications

The commission fosters accurate and consistent measurements needed to support research, development and exploitation of electromagnetic technologies across the spectrum and for all commissions.

These may further be evolved in due course of time keeping pace with the rapid advancement in radio science and communication and the related technologies

During this triennium Long Range Planning Committee (LRPC), under the chairmanship of Prof. P. Cannon, was quite active through discussions (via teleconferences and emails) with respective chairs of commissions. The following aspects have been emphasized for Commission A. The emerging topics of the commission are identified as a. developments of quantum standards b. GNSS timing systems c. nano-metrology and d. effect of em waves on eco-system (man and environments). The primary technical domain of commission is obviously instruments and measurement. This should give emphasis on social aspects of science and technology and also on navigation. The secondary areas are well recognized as antennas, propagation, electromagnetic compatibility, electron

device and system, laser & electron optics, magnetic, microwave theory & techniques and optics & optical technology.

The preparation of the session of the 2011 General Assembly in Istanbul was one of the major activities. Organization of technical programme and Interactions and discussions were initiated to work out topics tentatively since early 2009.

Recent decade has seen tremendous progress in optical clocks. With the availability of ultra stable clocks in different parts of the world separated by few thousands of kilometers, it has become a challenge to compare their performances with a short span of time. Continuous efforts are being put by many laboratories to make the time scale more stable and more accurate. The state-of-the-art in antenna measurements, with an emphasis on both near-field measurements and remote measurements have made many strides in recent years, with new fast methods. New communications technology leads to the inevitable need for new measurement techniques to properly characterize the systems. Recent advances in radio astronomy technology enable significant progress in the timing precision that will cumulate in the extraordinary experiments possible with the future Square Kilometer Array (SKA).

Noting the above facts, some emerging topics have been focused in the technical session of the Istanbul General Assembly. Few speakers who are eminent in respective field could be consented to give talks. Based on the responses, sessions covering following topics have been finalized.

These are Low Noise Microwave Generation, Fractals Design and Measurement, Time Scale, EM Materials, Antenna Measurement, Pulsar Timing and Time Transfer, Optical Frequency Metrology and Communication Metrology. Many of the above topics were of common interest for few other commissions. Some joint

Commissions could be arranged and a good response from the delegates with contributed papers was received. Respective session-conveners took special efforts to encourage the concerned experts for submission of papers and participation. With the help of very enthusiastic session conveners, the overall technical programme of Commission A of the Istanbul general assembly took a nice shape.

A tutorial talk on a special emerging topic of “Single Electron Tunneling” was given by Dr. Stephen Giblin of NPL UK. Topic was fundamental in nature, to be precise, it was related to the redefinition of the unit of electric current by counting number of electrons per second.

Commission A has given notional support in the last three years to organization of many conferences held across the world - particularly those have some connection with the activities related to Commission A. APRASC 2010 which was held in Japan had given good emphasis on the topics related to Commission A. It was well attended by experts of commission A.

The issue related to the continuation of “Leap Second” has been an important international debate. International Telecommunication Union (ITU) is supposed to decide on this based on Recommendations ITU\_R\_TF.460-6. Experts of commissions A and respective national representatives contributed substantially to discussions on the continuation of “Leap Second”. These discussions will help in making the final decision on this long pending issue.

For the election of New Vice, requests have made to national committees for nomination of candidates. Two nominations received e.g. Dr. Y. Koyama, NICT,

Japan and Dr. D. Matsakis, USNO, USA. After voting Dr. Koyama was elected as New vice chair of the commission A for the next three years.