

Introduction of URSI



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Introduction of URSI



- Union Radio-Scientifique Internationale.
- International Union of Radio Science.
 - a non-governmental and not-for-profit organisation,
 - Operates under the auspices of the International Science Council (ISC).
- URSI stimulates and co-ordinates international radio science,
 - pure research,
 - applied research (applications).

URSI MISSION STATEMENT



Radio science encompasses the knowledge and study of all aspects of electromagnetic fields and waves.

The International Union of Radio Science (Union Radio-Scientifique Internationale), a non-governmental and non-profit organisation under the International Council for Science, is responsible for stimulating and co-ordinating, on an international basis, studies, research, applications, scientific exchange, and communication in the fields of radio science.

http://www.ursi.org/ursi_mission.php

URSI Objectives



- To encourage and promote international activity in radio science and its applications, for the benefit of humanity;
- To encourage the adoption of common methods of measurement, and the intercomparison and standardisation of the measuring instruments used in scientific work;
- To stimulate and co-ordinate studies of:
 - the scientific aspects of telecommunications using electromagnetic waves, guided and unguided;
 - the generation, emission, radiation, propagation, reception, and detection of fields and waves, and the processing of the signals embedded in them.
- To represent radio science to the general public, and to public and private organisations.

The Origins of URSI



- **1919: First General Assembly of International Research Council**
- **Founding of the “International Union of **Scientific Radio Telegraphy**”**
 - **Stated objective was to promote scientific studies of radiotelegraphy and to encourage research requiring international cooperation in this field**
- **Creation of Union of Astronomy**
- **Union of Geodesy & Geophysics**
- **Union of Mathematics**

Centenary Celebrations

- 1st General Assembly in July 1922 Brussels
 - Belgium
 - France
 - United Kingdom
 - USA.
- Various celebratory events from 2020 - 2023.



The founding fathers in 1914.

In the Beginning...

- The history of URSI is intimately tied to the history of **wireless radio**
- 1894-95: **Marconi (1874-1937)** demonstrated radio telegraphy
- 1899: First transmissions over English channel
- 1901: First transatlantic transmission
- 1902: Transmission at night > in daytime: discovery of ionosphere



G. Marconi

The Start of URSI

1st URSI General Assembly: Brussels, July 1922

- Belgium
- France
- United Kingdom
- USA

Agenda:

- Measurements of the EM field and its variations
- Study of variations in radio goniometrical measurements
- Study of statics and disturbances in general measurements

The 1st Resolution of URSI :

“At the meeting of Commission I, it was generally agreed that the unit of frequency was identical with the unit of time interval, and that no independent definition should be given.”

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The International Research Council.

THE International Research Council, of which the fourth general assembly was held at Brussels in July, was formed in 1919, and the convention under which it carries on its work terminate at the end of 1931 unless it has been previously renewed by the countries represented on the Council.

Designed to replace some of the international scientific associations that had lapsed during the War, its aims have been defined to be to co-ordinate international efforts in the different branches of science; to initiate the formation of international scientific associations; to direct international scientific activity in subjects not falling within the purview of any existing association; and to enter into relation with the governments of the countries adhering to the Council in order to promote investigations falling within its competence.

The countries which joined the Council at its formation were fifteen in number, but since then many others have notified their adhesion to it, until at the present time thirty-five countries are represented on the Council and take part in its deliberations.

One of the first acts of the Council was to promote the formation of international associations, or Unions, for the furtherance of certain branches of science in which international co-operation is essential, with the result that the Unions of Astronomy, of Geodesy and Geophysics, of Pure and Applied Chemistry, of Mathematics, and of Radio-Telegraphy were formed in 1919. Later, in 1922, others dealing with Pure and Applied Physics, Biological Sciences, and Geography were organised, thus bringing the total number up to eight.

These Unions are practically autonomous, arranging their own meetings, appointing their own officers, collecting and dispensing their own funds, and initiating research and co-operative work in their own fields of scientific activity, very much as did the earlier associations the work of which they are carrying on.

During the past nine years, each of these Unions has held several meetings at which addresses have been delivered, scientific communications have been discussed, and arrangements have been made for future co-operation and research. The Astronomical Union, which has now been joined by 24 countries, has met at Rome, Cambridge, and Leyden; the Geodetic and Geophysical Union, which has a membership of 32 countries, has held meetings at Rome, Madrid, and Prague; the Chemical Union, representing 28 countries, has

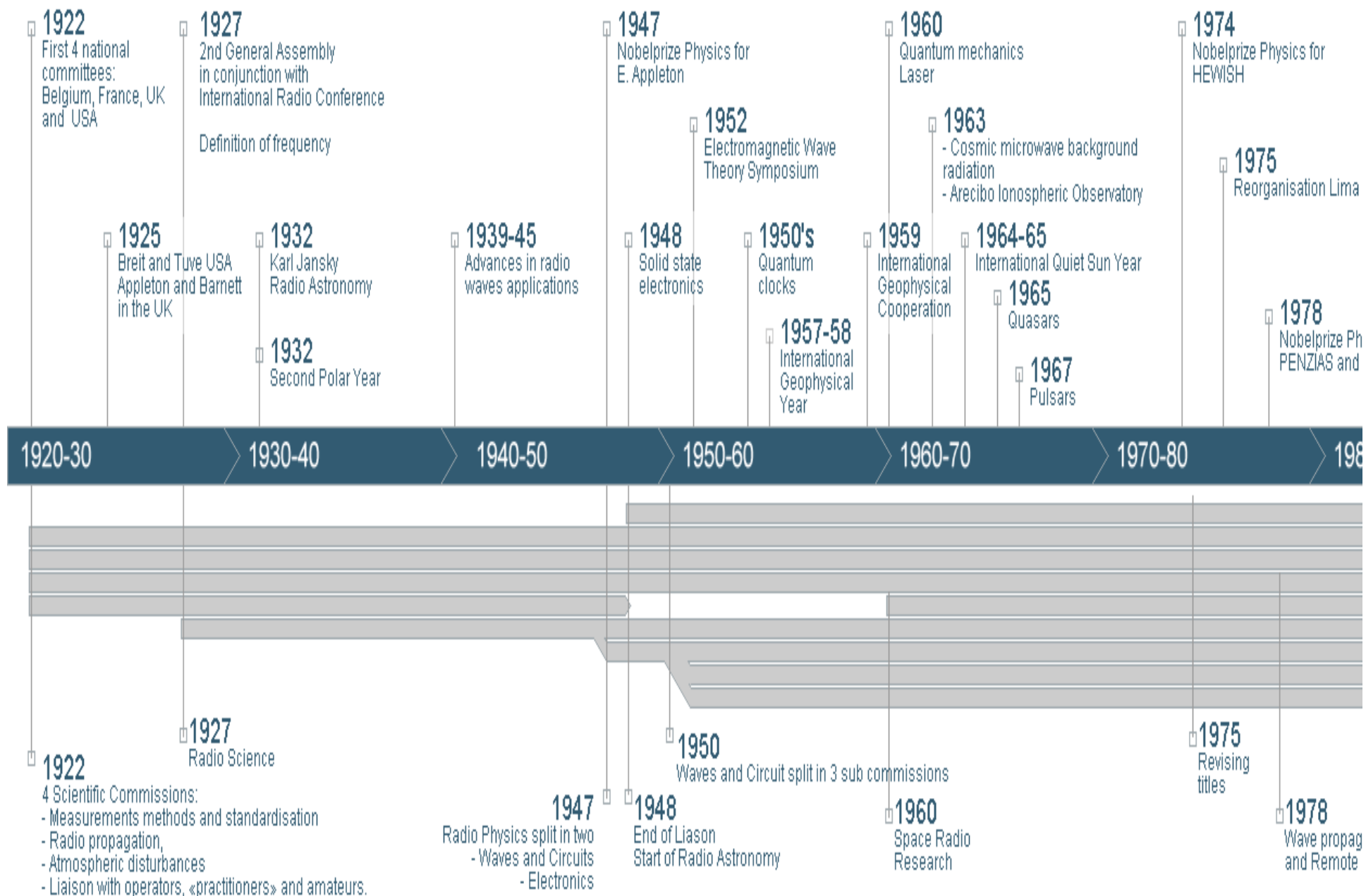
The Start of URSI



- **Commissions in 1922:**
 - I. **Measurement Methods and Standardization**
 - II. **Radio Propagation**
 - **Electromagnetic Field**
 - **Radio Goniometry**
 - III. **Atmospheric Disturbances**
 - IV. **Liaison with Operators, Practitioners, and Amateurs**

From the minutes:

“In view of the moral and technical importance of the Commission on Measurement Methods and Standardisation, as well as of the usefulness of its work for the public at large, the Commission should be numbered ONE since it might draw governmental subsidies”



10 URSI Commissions



- URSI provides a (possibly) unique link between science and engineering
- Operates over the full breadth of radio science disciplines
 - A: Electromagnetic Metrology
 - B: Fields and Waves
 - C: Radio-Communication Systems and Signal Processing
 - D: Electronics and Photonics
 - E: Electromagnetic Noise and Interference
 - F: Wave Propagation and Remote Sensing
 - G: Ionospheric Radio and Propagation
 - H: Waves in Plasmas
 - J: Radio Astronomy
 - K: Electromagnetics in Biology and Medicine

URSI Commission A



The Commission promotes research and development of the field of measurement standards and physical constants, calibration and measurement methodologies, improved quantification of accuracy, traceability, and uncertainty, and the intercomparison of such.

Areas of emphasis are:

- The development and refinement of new measurement techniques and calibration standards;
- Primary standards, including those based on quantum phenomena, and the realization and dissemination of time and frequency standards;
- Characterization of electromagnetic properties of materials, physical constants, and properties of engineered materials, including nanotechnology;
- Methodology of electromagnetic dosimetry/measurements for health diagnostics, applications, and biotechnology, including bio-sensing;
- Measurements in advanced communication systems, space metrology, and other applications, including antenna and propagation measurement techniques.

The Commission fosters the best practices and training for accurate and consistent measurements needed to support research, development, and exploitation of electromagnetic technologies across the spectrum and for all Commissions.

Recent Activities and Future Aspects of Comm A



- In 2014, Comm A adopted the Resolution on ‘Opinion on the redefinition of UTC requested by ITU’ for considerations at Radiocommunication Assembly of ITU-R.
- To respond the new further request from ITU-R, Comm A is taking lead within URSI to summarize revised Resolution towards General Assembly and Scientific Meeting (GASS) in 2020.
- Comm A is following the developments in the field of Time and Frequency metrology, also by organising special sessions and inviting relevant scientists at the URSI meetings, with the aim to diffuse the information and evaluate the impact of a possible redefinition of the second in the activities of Comm A as well as the other URSI Commissions.

Comm A Sessions at GASS2020



A01 SI Units

A02 Time and Frequency Standards

A03 Advanced Time and Frequency Transfer Techniques

A04 Time Dissemination for Critical Applications

A05 Microwave Frequency Standards and Applications

A06 Metrology for Wireless Power Transmission Solutions

A07 Advances in Sensor Development and Applications

A08 Metrological Analysis of Material Properties

A09 Space Metrology

A10 Education and Training in Electromagnetic Metrology

A11 Measurements of Isotropic and Anisotropic Magnetodielectrics

A12 GaN based Power Amplifiers for satellite systems

A13 Metrology for Internet of Things

A14 Micro and Nanotechnology in Instrumentation and Measurement

A15 Characterization and Modelling of Microwave Transistors

A16 Advanced Techniques of Positioning and Timing

A17 Open Session

Summary



- URSI was founded in 1919 as International Union of Scientific Radio Telegraphy
- Grew from 4 national Members to 44
- Grew from 4 Commissions to 10
- Commission A deals with Electromagnetic Metrology

Following and promoting research in view of a possible redefinition of SI second is one of the scopes of Commission A