O. Engvold (ed.), Transactions of the International Astronomical Union, Vol. XXVB.

COMMISSION 31: TIME

(TEMPS)

1. Appointment of Officials for 2003-2006 and membership of the Commission

Drs. D.N. Matsakis and P. Defraigne have been elected as the President and Vice President of the Commission for the next term, 2003-2006, respectively. As for the Organizing Committee Members, we welcome P. Defraigne and M. Hosokawa as new members and appreciate the outgoing members, Drs. Backer, Beutler, Fukushima, Qi, Veillet and Winkler, for their contributions and efforts.

The decease of two members has been reported: Dr. H.W. Hellwig and Dr. N.S. Blinov. The IAU secretariat indicated that 8 new members have asked to participate to Commission 31.

2. Reports of institutions

G. Petit presented excerpts from the written report of Commission 31 for the triennium since the past General Assembly. The Commission web site has been developed and may be accessed at http://www.bipm.org/IAU31. The relative frequency stability and the accuracy of atomic time scales, like International Atomic Time TAI, is now of order 1×10^{-15} thanks to progresses in clock technology and in clock comparison techniques. Cold atom primary Cs standards have a stated accuracy of 1×10^{-15} and a stability in the 10^{-16} region. Other cold atom clocks provide even better prospects, as well as clocks based on trapped ions. Frequencies based on optical and microwave transitions can now be compared with a similar or even better uncertainty thanks to femtosecond comb technology. Clock comparison techniques based on GPS (see http://maia.usno.navy.mil/gpst.html), or on dedicated Two Way technology provide adequate performance when averaging data over one or a few days, and should be improved to accompany the progresses of clocks.

Since 1999, a number of organizations initiated a review on the future of the UTC system. Several working groups have been initiated, notably by the International Telecommunications Union (Special Rapporteur Group (SRG) in the Working Party 7A), by the International Union of Radio Science, and by the IAU following Resolution B2(2000). At a meeting in May 2003, the SRG of ITU WP7A recommended a proposal to shift from UTC to a uniform time scale by 2022 to allow time for transition to all concerned parties.

Various meetings relating to the scope of Commission 31 were held. In addition to the usual meetings of the time and frequency community, the fourth International Symposium on time scale algorithms, sponsored by the USNO, the BIPM and the IEN,

was held in Sèvres (France) on 18-19 March 2002. A special issue of *Metrologia* has published the Proceedings.

E.F. Arias presented the report of the BIPM time section.

D.N. Matsakis presented the report of the USNO time service department. The USNO serves as the precise time source of the US Department of Defense and for GPS, and is specialized for real-time applications. For that reason the USNO has a large ensemble clocks - currently 74 cesium and 18 cavity-turned masers. Its realization of UTC has steadily improved over the years. In the last three years UTC-UTC(USNO) was about 4 ns RMS, while in the last year the RMS was 3 ns. By the time of the next IAU General Assembly they don't expect to have more frequency standards, but do hope to have at least one working rubidium-based atomic fountain in routine operation. They are very much interested in international cooperation in all its aspects, particularly with regards to GNSS systems and time transfer. For this reason they have contributed to the discussions between the United States and the Europeans concerning Galileo/GPS compatibility, and between the United States and the Japan concerning the QZSS system.

M. Hosokawa presented the report of the time department of CRL.

3. Communications

Y. Ilyasov (Pushchino Radio astronomical Observatory, Russia) reported on the status of pulsar timing, in particular-for millisecond (MS) pulsars, based on results, presented to Symposium 218 IAU (14-17th July 2003, Sydney) and to special Workshop "Timing Array" (14th July 2003, Sydney). A lot of millisecond pulsar timing results were presented on the Timing Array Workshop from observatory at: Parkes (Australia), Jodrell Bank (United Kingdom), Arecibo (Puerto Rico), NRAO (United States), Kalyazin (Russia), Kashima (Japan). It was mentioned also that very fruitful results have been obtained at Nançay (France), Westerbork (Netherlands), GMRT -Puna (India) and somewhere else. The convener of the "Timing Array Workshop" and IAU Symposium 218- Prof. R.N. Manchester (ATNF, CSIRO, Australia), who was awarded by Australian Research Council in 2003 yr. for project "Precision Pulsar Timing and its Application", declared in accordance of the ITU-R recommendations (Doc.7/81 E), that it is necessary to combine all observing results and techniques for joint long-time pulsar monitoring both for establishing a long-term standard of time based on pulsar and also for joint ephemeris supplements and software. It was shown by the Russian-Japanese results of MS PSR 1937+21 timing in more than 5 years that RMS of Time of Arrival (TOA) Residuals, combined from Kalyazin (Russia) observations at 0.6 GHz and Kashima (Japan) data at 2.2 GHz, are about 2 microsec. It corresponds fractional stability about 2x10E-14. It was achieved when Dispersion Measure (DM) was proved to had a long-time linear change with slope -0.0012 per year. Finally Prof. Ilyasov mentioned that Study Group 7 of the ITU-R refereed to Question ITU-R 205/7 has issued the Opinion about importance of long-term pulsar timing both for astrophysics and time keeping (Doc. 7/81 E, Oct.2002) and has drawn attention of the IAU to the actuality of the problem.

T. Fukushima reported on a recent work by W. Harada and himself on the harmonic decomposition of the time ephemeris TE405 that is useful to compute the transformation between geocentric and barycentric coordinate times.

Gérard Petit
President of the Commission

https://doi.org/10.1017/S0251107X00026511 Published online by Cambridge University Press