

Commission J

1994 - 1996 triennium report

1. Formal account

All meetings and working groups, suggested by URSI at the Kyoto GA were successfully realized at the specified times. The triennium Budget was successfully used as well, only USD 800 left for the General Assembly. This may result in the some troubles at the coming GA.

2. Science report

I. Last triennium happened to be connected with 100 Years anniversary of the Radio. Commission J has 100 Year experience of exploration of the surrounding Space by radio waves. 1895- first very simple antenna device and receiver was used to explore the Electromagnetic Waves from the lightning, (A. Popov "Thunderstorm Marker"). It was the first case of receiving of the radio waves from the Natural Source. 1932-Discovery of the Radio Emission from the Milky Way (K. Jansky) 1946-1952- Discovery of the numerous extragalactic objects, including Andromeda Nebulae and very distant objects, as CYG-A. 1967-Discovery of the Hot Universe Radio Waves, connected with the recombination of the gas at redshift about 1000, that is with less than 1 mln. yr. age of the Universe. In the Last 3 Years it was demonstrated, that only by Radio it is possible to penetrate into "Singularity Epoch", were all features of the present day Universe were in the "seed" form. First indications of the existence of the primordial "GENE" were communicated recently by Britain and USA groups and it opens an absolutely new way of understanding of Evolution of Universe, and, what is also very important, it can help to construct the complete Physical Theory of the Natural Laws (TOE, Theory Of Everything) using "Singularity" as a Big Accelerator of ev. $10E19$ energy. Last three Years were very successful in the increasing of the range, up to which discrete objects may be found. Absolute record was settled by VLA (USA), few micro-Jansky in flux density. At this level all powerful radio galaxies like CYG-a in principle can be observed at any distances up to recombination epoch, that is throughout the whole Universe!

II. Ground Based Radio Tools happened to be even more powerful in the solution of the "Black Holes" problem (which were suggested as the major source of energy in the Universe) than Hubble Space Telescope. The gravitational potential around the Giant BH candidate in one of the nearby active galaxy was studied using Water Masers very narrow line emission by several order of magnitudes more accurately, then by any other means and big point-like mass inside 0.1 pc volume in the nuclear of the galaxy was confirmed. (First observations of this kind were communicated by Japanese observers at URSI GA in Kyoto)

III. Great need in the more and more powerful Radio Astronomical instrumentation for very different targets presses strongly on the rate of the developments of the radio telescopes facilities. Practically "Ideal" radiometers appeared with noise, no greater than the sky noise (HEMT's up to 100GHz, He3 cryo bolometers at mm- submm. waves). Not only flux density sensitivity increased by factor about 10 during last 3 Years, but also resolution of the Ground Based radio astronomy by factor 3 and VLBI technique now possible even at 1 mm. During the Lille GA big jump are expecting through VSOP Japanese Space mission, which will be followed by RADIOASTRON even more ambitious mission to break through the limitation of the Earth geometry. Greatly improved the single dishes and Ground Based arrays (e.g. : Arecibo, Jodrell Bank, Effelsberg, RATAN-600; VLBA and GMRT). Three WG's are discussing next generation instrumentation, which include the Space and Ground Based projects. Few sub-projects trying to use Lagrangian Point 2 as a site for the permanent observation of the CMB. Few sub-project connected with 10-100 fold increasing of the collecting area of the Ground Based Radio Telescopes (SKAI; KARST). Several projects for very short waves are in preparation, some of them as big as 10 000 m.sq. VLBI technique may penetrates into the submm-IR- and even in optics domains in the next decade.

IV. Efficiency of the Radio Astronomy Community depend strongly on the interference level- exponential growth of the Energy consumption results in the exponential growth of the EM Pollution. Last decade the situation dramatically escalated due to the mobile communication technology and it is very likely that the range of the Radio Telescopes will

collapse to the negligible value and in the next decade it will be impossible even to repeat experiments of the last decade. It is clear, that the boundary between "People-to-People" communication and "People -to-Universe" communication should be regulated at the much higher level (comparable with United Nations) and commercial considerations have to be balanced by others one, connected with the very existence of the "HOMO SAPIENCE", which is impossible without contact with the Sky.

Prof. Yuri Parijskij, Chair