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The using of new generation low-frequency radio telescopes for the planetary and stellar radio emission studies

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Abstract

The investigations of the low-frequency radio emission of the magnetized objects in the Universe are the important part of the scientific programs of the future radio telescopes. These projects include the LOFAR (the Netherlands) [1], E-LOFAR (LOFAR stations in many European countries), LWA (USA). Similar approach is realizing in France (LSS-LOFAR Super Station) and in Ukraine (GURT-GIANT Ukrainian Radio Telescope) [2]. We would like to special underline that many of the lessons gained from the past experience remain valid today and in this presentation will be reviewed many of these areas of science and technology.

Specifications of Experiment Parameters

Main goal of new astronomical experiments is to reach maximum sensitivity rather than angular resolution for the radio emission when confusion effect plays the secondary role. It is important just for the study of sporadic and /or pulse radio emission of the objects as the Sun, Jupiter, other planets, exoplanets, active stars, pulsars etc. The using of the largest existing low-frequency radio telescopes (UTR-2, URAN, NDA) confirmed the high astrophysical significance of these studies and the importance of the future investigations with high sensitivity (<1 Jy), broad (>20 MHz) high time and frequency resolutions (1μs-1ms and 1 kHz-10 kHz respectively), and dynamic range (~90 dB). These parameters should be realized in the new generation radio telescopes.

Conclusion

The work by the current and future generations of low frequency telescopes and investigations has pioneered many of the scientific and technical areas that will be exploited by the emerging new instruments. It includes the solar system studies, planetary radio emissions investigations, active stars, interplanetary scintillations, scattering effects in the IP medium, possibilities of the interplanetary medium studies with low frequency radio recombination lines, solar system radar investigation, and so on.

References

[1] Kassim, N., et al. (2004) *Planet. Space Sci.*, 52, 1343–1349.

[2] Konovalenko, A. et al. (2005) *Experimental Astronomy*, 16, 149-164.