The International <u>RadioAstron</u> Mission – a Earth-Space Interferometer with orbit up to 350 000 km

The **RadioAstron Project** is designed by the Astro Space Center of the P.N. Lebedev Physical Institute of the Russian Academy of Science, and the S.A. Lavochkin Federal Research & Production Association, Roscosmos in cooperation with numerous Russian and international organizations.

Preliminary launch time - 2011.

The **goal of the project** is to carry out investigations of various types of astrophysical objects of the Universe with an unprecedent high angular resolution in the centimeter and decimeter wavelength bands.

Such resolution is attained by the 10 m **Space Radio Telescope** (on-board of the Spacecraft **Spectr-R**) working together with the largest **ground radio telescopes** in the interferometer mode.

Main Parameters of the RadioAstron Mission

Frequency band [GHz]	0,327	1,665	4,83	18 - 25
Bandwidth, 2-pol. [MHz]	2 x 4	2 x 32	2 x 32	2 x 32
Fringe size at 350.000 km baseline [micro arcsec]	540	106	37	7 - 10
Detection limit 1-σ [mJy] (ground radio telescope GBT, 16/4 MHz bandwidth, 300 s integration)	42	4	4	10

The unprecedented super high angular resolution up to 1 µarcsec





The Scientific Program of the RadioAstron Observatory

- Galactic nuclei (supermassive black holes, event horizon, particles acceleration, ultimate brightness temperatures, Faraday rotation, magnetic fields, cosmic rays, superluminal motion).
- Cosmology effects; redshift dependence of various physical parameters of galactic nuclei; dark matter and dark energy effects.
- Star and planetary systems formation, masers and Megamasers.
- Stellar mass black holes and neutron stars.
- Interstellar and interplanetary media.
- Fundamental astrometry and development of the high precision celestial coordinate frame.
- Development of the high precision model of the Earth gravitational field.



Parameters of the Orbit

Period (variable)	7 - 10 days.
Major semi-axis	189 000 km.
Initial inclination	51.6°.
The perigee variation	From 10 000
orbit evolution due to	to 70 000 km.
the Moon gravity 1	

Investigations with the Space-Ground RadioAstron interferometer

- obtaining the continuum, polarized and spectral images of various types of sources with moderate and ultra high angular resolution at the whole range of baselines projections;
- measuring the sources coordinates, proper motions and structure variations;
- high precision determination of the RadioAstron orbit parameters.

Design and Testing of the Space Radio Telescope









