

Observational capabilities of solar satellite “Coronas-Photon”

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"Coronas-Photon" mission is the third satellite of the Russian Coronas program on solar activity observation. The main goal of the "Coronas-Photon" is the study of solar hard electromagnetic radiation in the wide energy range from UV up to high energy gamma-radiation ($\sim 2000\text{MeV}$).

Scientific payload for solar radiation observation consists of three type of instruments: 1) monitors (“Natalya-2M”, “Konus-RF”, “RT-2”, “Penguin-M”, “BRM”, “Phoka”, “Sphin-X”, “Sokol”) for spectral and timing measurements of full solar disk radiation with timing in flare/burst mode up to one msec. Instruments “Natalya-2M”, “Konus-RF”, “RT-2 will cover the wide energy range of hard X-rays and soft Gamma rays (15keV to 2000MeV) and will together constitute the largest area detectors ever used for solar observations. Detectors of gamma-ray monitors are based on structured inorganic scintillators with energy resolution $\sim 5\%$ for nuclear gamma-line band to 35% for GeV-band. PSD analysis is used for gamma/neutron separation for solar neutron registration ($T > 30\text{MeV}$).

“Penguin-M” has capability to measure linear polarization of hard X-rays using azimuth are measured by Compton scattering asymmetry in case of polarization of an incident flux.

For X-ray and EUV monitors the scintillation phoswich detectors, gas proportional counter, CZT assembly and Filter-covered Si-diodes are used. 2) Telescope-spectrometer TESIS for imaging solar spectroscopy in X-rays with angular resolution up to 1” in three spectral lines and RT-2/CZT assembly of CZT pixels with coded mask aperture. 3) Two semiconductors monitors for charge particle energy spectra and angular resolution registration.

Satellite platform and scientific payload is under construction to be launched in late 2007. Instruments are provided by Russia, India, Ukraine and Poland.

Satellite orbit is circular with initial height 550km and inclination 82.5degrees. Accuracy of the spacecraft orientation to the Sun is better 3 arcmin. Nominal mission lifetime at least 3 years extended 5 years.