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Astro Space Center
RadioAstron Newsletter
Number 18
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RadioAstron Early Science Program continues to deliver interesting results

The Space VLB interferometer RadioAstron continues to study the unexplored territory -- observe active galactic nuclei at ultimate baseline length and angular resolution. Particularly, the interferometer has successfully detected interference signals from the galactic nuclei OJ287, BL Lac, 0716+714, 0823+033, 1823+568 at projected baselines 6-11 Earth diameters at 6 and/or 18 cm. The AGN team has also seen indications of detections at even longer projections, this is currently under investigation. First successful results were delivered at the shortest wave length, 1.3 cm, as well. So far between 2.5 and 4.3 Earth diameters for the galaxies 0716+714, 0748+126 and 1749+096. These results suggest that AGN cores of many of the above mentioned objects have apparent brightness temperature about or more than 10^13 K.

Observations of the water maser in Cepheus A within the RadioAstron early science program resulted in a successful detection. Cepheus A is located at a distance of about 700 pc from the Sun and contains young cluster of massive stars and protostars. Maser emission of various molecules is formed in their vicinities. Bright water maser source contains numerous maser spots which are organized in clusters associated with different massive stars. Correlated signal was obtained between space radio telescope Spektr-R of the RadioAstron project and the 40-m ground radio telescope in Yebes (Spain) on November 18, 2012. Projected baseline of the space-ground interferometer was 3.5 Earth diameters (about 45,000 km) which sets up a record for maser observations and provides angular resolution up to 60 microarcsec. Preliminary data analysis shows that the observed correlated signal belongs to a short-living maser component which emerged as a result of a flare.

RadioAstron Green Bank Earth Station

A contract was signed last week between the AUI/NRAO and Lebedev Physical Institute to build and operate a RadioAstron Earth Station in Green Bank, WV, USA, which will track the satellite and collect science data using the NRAO Green Bank 140ft telescope. Tests to point the on-board high gain antenna to Green Bank and track it by the 140ft telescope have started in November 2012 and turned out to be successful. We hope to get it operational by the northern Spring 2013 in addition to the actively working station in Pushchino, Moscow region, Russia. This will allow to increase the total amount of available RadioAstron observing time by about two. This work is funded by Roscosmos.

RadioAstron Key Science Program workshop

About 50 researchers from many different countries have met in Max-Planck-Institute for Radio Astronomy (MPIfR) in Bonn on December 3-4, 2012, to present their ideas for the RadioAstron Key Science Program within the open sky RadioAstron Announcement of Opportunity 1. Discussed projects have covered active galactic nuclei, masers, pulsars, interstellar medium, transients, astrometry, gravity, and cosmology. The next step is the full proposal submission, deadline: February 1, 2013. We thank once again the MPIfR for the wonderful organization of the event.

With seasonal greetings!
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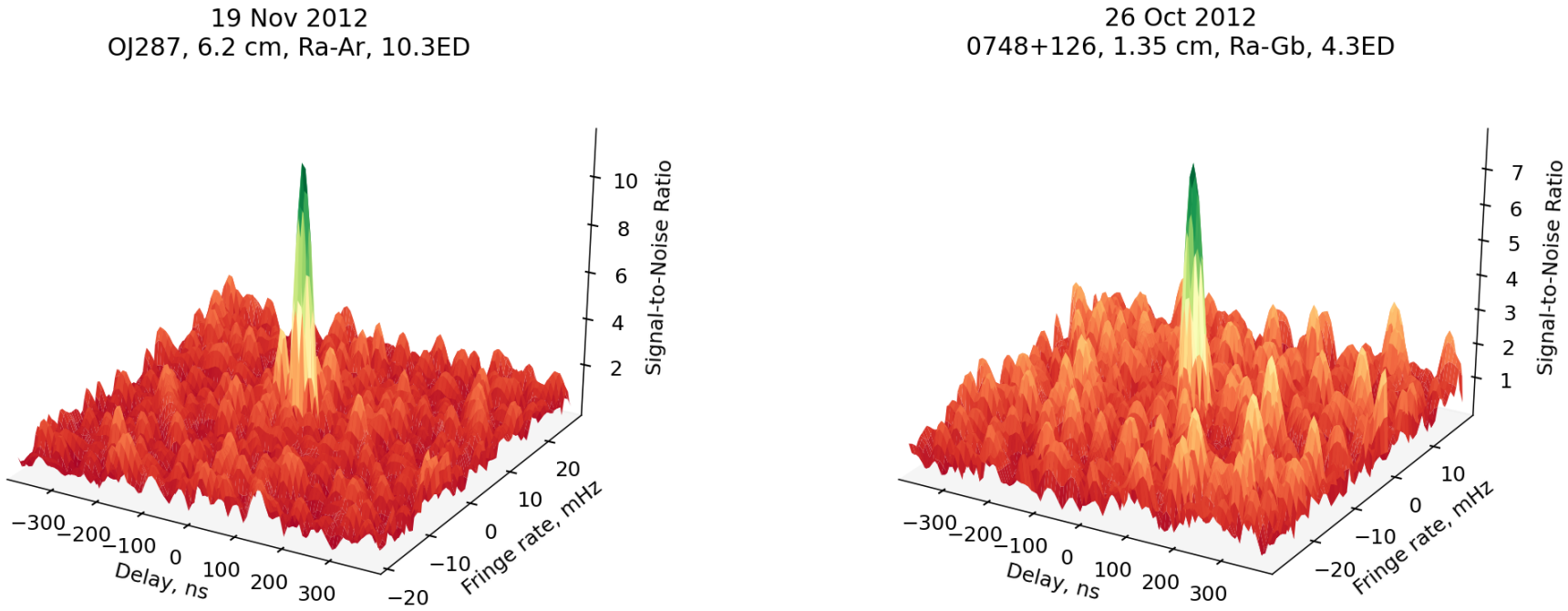
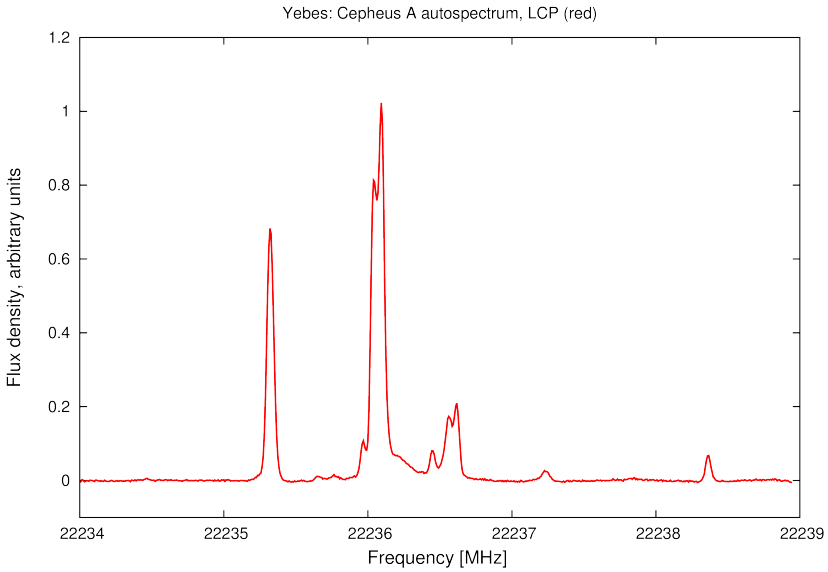
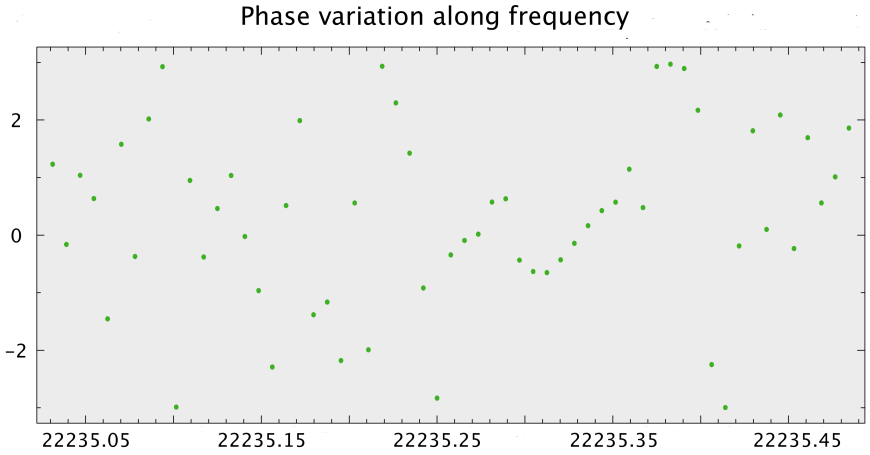
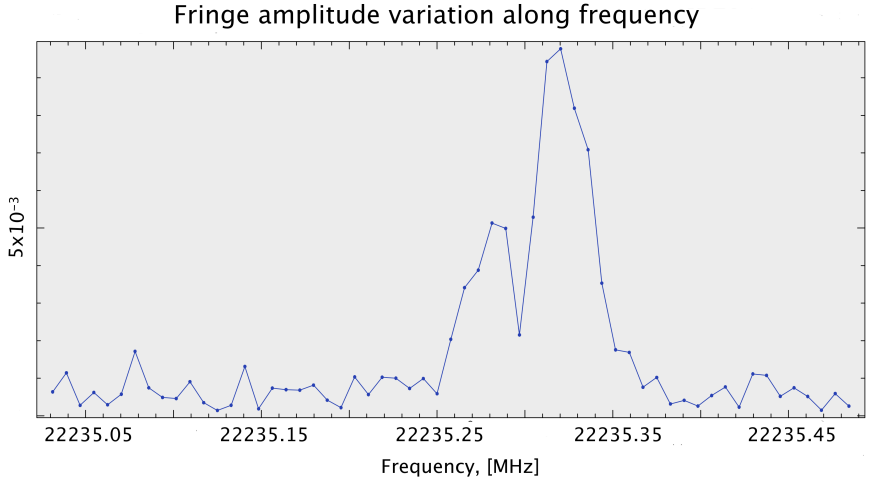


RadioAstron interference signal detected from active galactic nuclei.
On the left: BL Lacertae object OJ 287, 6 cm band, baseline SRT-Arecibo, projected baseline length about 10 Earth diameters (2 100 Mλ), signal-to-noise ratio about 12.
On the right: Quasar 0748+126, 1.3 cm band, baseline SRT-GBT, projected baseline length 4.3 Earth diameters (4 100 Mλ), signal-to-noise ratio about 8.







On the left: The spectrum of water maser in Cepheus A star forming region which was obtained with the 40 m radio telescope in Yebes (Spain).
On the right: cross-correlation spectrum of the compact feature obtained (the lowest frequency feature on the total spectrum) in combination of the 10 m space radio telescope (SRT) and the 40 m radio telescope in Yebes. Integration time is 570 sec. Projected baseline of the interferometer is 3.5 Earth diameters. The plots show the correlated flux in relative units and phase in radians versus frequency in MHz recalculated to the geocentric rest frame.