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Astro Space Center
RadioAstron Newsletter
Number 13
June 14, 2012
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Russian version of the Newsletter can be found here:
http://www.asc.rssi.ru/radioastron/news/news_ru.pdf

First RadioAstron 1.3 cm fringes!

Along with conducting the RadioAstron Early Science Program, the RadioAstron fringe search team continued interferometric tests at 1.3 cm (K-band) -- the shortest RadioAstron wave length. We are happy to report that the first K-band fringes were successfully detected on a baseline Spektr-R -- Effelsberg (MPIfR, Germany) from the compact quasar 2013+370. Moreover, these observations were organized in a dual-band mode. Simultaneous measurements at 6 cm were carried out on the baseline Spektr-R -- Westerbork (WSRT, the Netherlands). The 6 cm fringes were found on this baseline with delay and rate values which agree to the 1.3 cm results. The attached Figure shows the 6 and 1.3 cm fringes. The baseline projection was 1/4 of the Earth diameter.
This positive result marks the successful end of in-orbit tests of the ground-space radio interferometer RadioAstron.

RadioAstron coherence time

Coherence time in radio interferometry is the maximum time interval for which the interferometric signal can be coherently (without loses) integrated. Sensitivity of interferometric measurements is proportional to the square-root of this value. Typical coherence time of ground-ground very long baseline interferometric experiments is 1 to 15 minutes for centimerter wave lengths; it is determined by characteristics of the turbulent atmosphere, ionosphere, troposphere. Coherence time analysis is extremely important since it characterizes the overall sensitivity as well as stability of the system, including atomic clock.

We have perfomed an analysis of the RadioAstron coherence time at the shortest wave lengths, 6 and 1.3 cm, using observations from March 15 and May 12, 2012, consequently, on the baseline Spektr-R -- Effelsberg. Results are shown on the Figure attached. The signal-to-noise ratio increases as a square-root of integration time (fringe fitting interval) up to about 10 minutes at 6 cm and up to 2 minutes at 1.3 cm. This first estimate of the coherence time demonstrates high stability of the space element of the RadioAstron interferometer.

RadioAstron International Science Council meeting 2012

The RadioAstron International Science Council (RISC) will meet for several days in Pushchino, Moscow region, starting from June 18, 2012. The main goal of the meeting is to discuss the current status of the mission and plans for organization of future RadioAstron experiments. The meeting will unite representatives of Russian and International institutions including many major radio observatories of the world.

With best regards,
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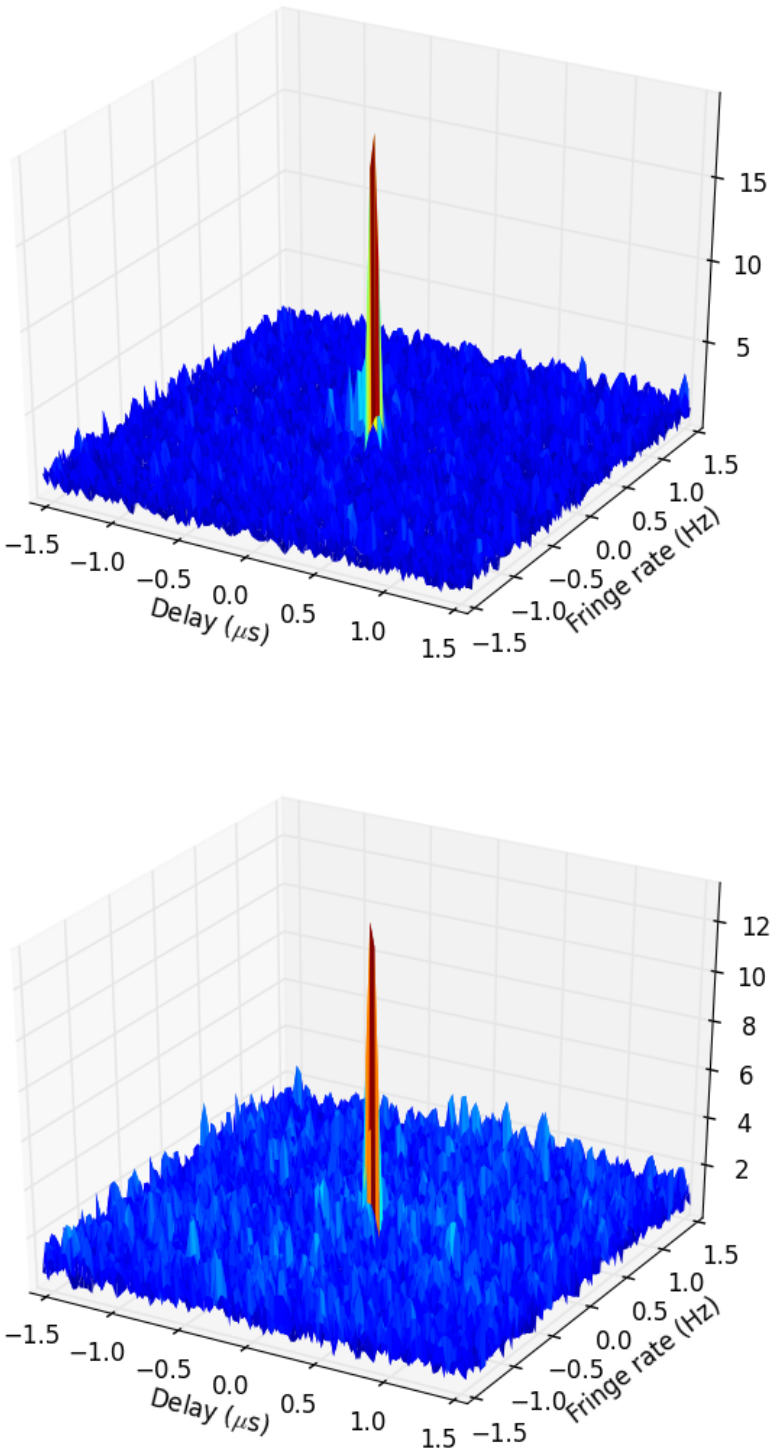
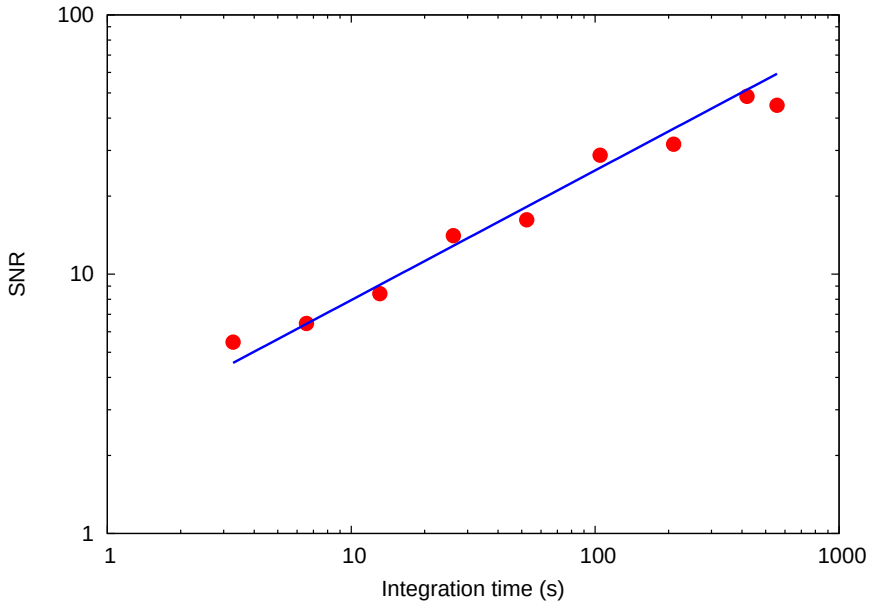
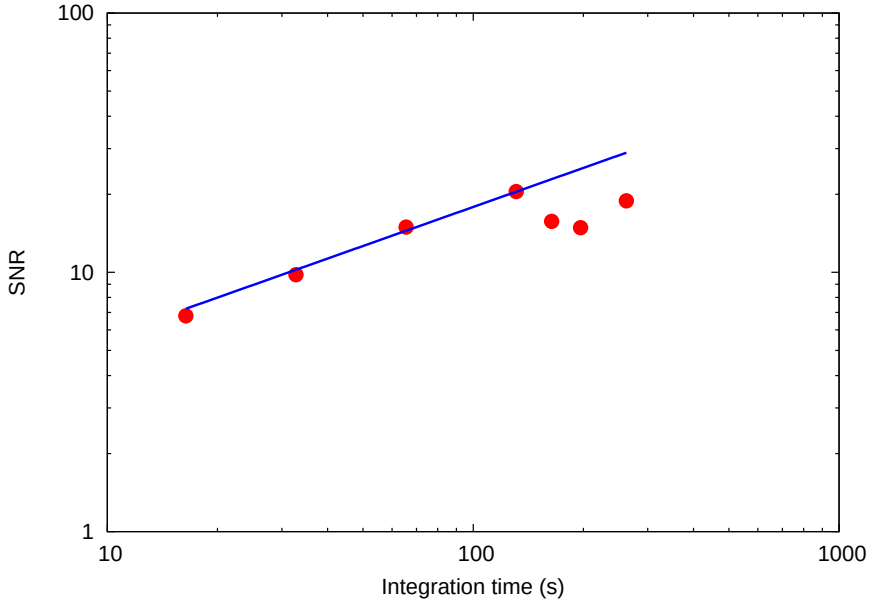


Fringes from the quasar 2013+370 on the baseline Spektr-R – Westerbork at 6 cm (top) and Spektr-R – Effelsberg at 1.3 cm (bottom) Integration time: 65 seconds. Baseline projection length: 1/4 Earth diameter. The signal-to-noise ratio is shown versus residual delay and fringe rate.





The signal-to-noise ratio versus integration time t. The line represents $\sqrt{t}$ dependence. Top: 6 cm band, bottom: 1.3 band. The linear approximation was done excluding the point for longest integration at 6 cm and excluding three last points at 1.3 cm.