



The 96-antenna multifrequency Siberian radioheliograph

Sergey Lesovoi, Alexander Altyntsev, Eugene Ivanov, and Larisa Kashapova
Institute of Solar-Terrestrial Physics, Russian Federation (svlesovoi@gmail.com)

The 96-antenna multifrequency Siberian radioheliograph, which is under construction at present, is described. The frequency range of the radioheliograph is from 4 up to 8 GHz. The radioheliograph data are complex cross-correlations for both circular polarizations at a number of frequencies from a given list. The longest baseline is of 622 m. This provides an angular resolution down to 13 arcsec at 8 GHz. The shortest baseline (fundamental spacing) is of 4.9 m. Because of such fundamental spacing one can completely avoid the spatial aliasing at frequencies below 6 GHz. The images at frequencies between 6 GHz and 8 GHz are non-aliased during most of the observation time. We plan to reach the sensitivity about 100 K for the snapshot (1 s cadence) image.

Wideband antennas with front-ends, analog back-ends, digital receivers and a correlator are described. A signal from each antenna is transmitted to a workroom by the analog fiber optical link. After mixing, all signals are digitized and processed by digital receivers before the data are transmitted to the correlator. The digital receivers and the correlator are virtually FPGA IP cores. So there are many ways to the delay tracking and fringe stopping. The fractional sample delay for delay tracking is described in detail. Also the choice of a number of quantization levels of the correlator is discussed.

The joint analysis of HXR and microwave spectral data, recorded with the radioheliograph prototype at a number of frequencies is presented. It is shown that the dependence of brightness temperature on spatial size of microwave sources could be used to determine moments when particle acceleration occurs.

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