Real-time data analysis with LOFAR: searching for (ultra)fast radio transients.

LOFAR is a new revolutionary low frequency radio telescope that consists of several thousand antennas spread over the Netherlands and several other European countries. It operates from 10 to 250 MHz and is highly flexible because most of the signal processing is digital. Therefore all three observing modes, astronomical imaging, high time-resolution beam forming and direct data storage from ring buffers installed for each dipole, can run simultaneously. The Fast Radio Transients Search (FRATS) project uses this capability to search in real-time for dispersed millisecond flashes from astrophysical origin, such as pulsars, rotating radio transients and the mysterious fast radio busts, a class of highly dispersed flashes that have recently been discovered and that are likely from extra-galactic origin. The FRATS observing method optimises on observing time and on field-of-view in the real-time search. Once an interesting signal has been found, it uses the data from the ring buffers to zoom in on the position of a trigger to find its origin off-line. In this contribution I will discuss the real-time trigger, off-line analysis and current results. In addition I will explain another interesting real-time feature of LOFAR: the analysis and correlation of triggers running on individual antenna data to search for nanosecond scale transients.

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