Report from LOFAR transients workshop

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MWA Meeting, 20th January, 2009
LOFAR and the Transient Radio Sky

- December 15th – 17th, 2008 in Amsterdam
- All slides online at http://www.transientskp.org/workshop/schedule
- LOFAR is now beginning to collect science-quality data
- Workshop aims were to
  - Present results from commissioning observations
  - Plan for early science results
Program outline

- About $1\frac{1}{2}$ days of science talks
  - Jets from X-ray binaries, young stars and AGN
  - Pulsars with LOFAR
  - RRATs, millisecond radio bursts
  - Coherent bursting phenomena — solar and planetary flares
- About $\frac{1}{2}$ a day of technical/software talks
  - Transient detection pipeline
  - Data archiving
  - Event handling
- About 1 day of synergies with other instruments
  - ATA, MWA, Fermi, Liverpool, ULTRACAM, Faulkes, MAGIC
  - LSC/Virgo interferometers
LOFAR project timeline

Rollout Timeline

Dec 08  CEP hardware tender closed
Jan 08  First NL station operational
Feb 08  Partial CEP storage and offline cluster
Apr 09  5 Remote stations and superstation
Apr 09  Standard imaging pipeline ready
Jun 09  20 NL + 3-4 EU stations completed
Aug 09  Global Sky Model survey begins
Dec 09  36 NL + 8 EU stations online

Ref: Michael Wise
Current results from LOFAR

Recent LOFAR imaging results

50+ supernova remnants,
Many $z > 2$ radio galaxies,
A2255, A2256, M82 ...

(courtesy S. Yatawatta)

Ref: Michael Wise
LOFAR transient science

LOFAR Transients science working groups

**JETS** (Sera Markoff) *this afternoon*
Accreting binaries, YSOs, rapid AGN variability

**PULSARS** (Ben Stappers) *this afternoon*
Pulsar / friends of pulsars survey / monitoring

**FLARE STARS** (Rachel Osten) *tomorrow*
Active stars, brown dwarfs

**PLANETS** (Philippe Zarka) *tomorrow*
Solar system and extrasolar planetary radio bursts

Ref: Rob Fender
LOFAR transient modes

LOFAR transients 'modes'

1. Radio Sky Monitor
   Monitoring of a large fraction of the sky ~daily

2. Targetted surveys
   -- e.g. for pulsars, nearby star systems, known active/interesting systems, monitoring of Virgo cluster, follow-up of new transients

3. Piggybacking
   Search all LOFAR observations with our automated tools *(Tuesday afternoon)*

Ref: Rob Fender
The LOFAR transient detection pipeline

- John Swinbank (tkp08-swinbank.pdf)
- http://www.transientssp.org/workshop/schedule
The LOFAR transient detection pipeline

- Developed in Python (2.5/2.6) and C++
- Custom source extraction (RMS noise or FDR based)
- MySQL currently used for database
- MonetDB being investigated — better performance (> 10×)
- “Responders” to deal with queueing and sending events
Archival transient searches — VLA

- Martin Ball, Rob Fender (tkp08-bell.ppt)
- http://www.transientskp.org/workshop/schedule
Archival transient searches — MOST

- Molonglo Observatory Synthesis Telescope
- 843 MHz, 45" resolution
- 3 major surveys since 1980’s:
- Aim to add limits to Bower snapshot rates analysis

*Image ref: Keith Bannister (USyd)*
MWA–LOFAR collaboration.

- Sharing software, algorithms and ideas for transient detection
- We can learn from LOFAR data management strategy

Could LOFAR and MWA observe a common field?
- Suggested by Rob Fender
- Do (quasi-)simultaneous observations of a low-dec field
- A good overlap field would be at $\delta \sim +10$ (Virgo cluster)
- Start in commissioning phase
- Good for science, calibration/testing and politics :)