

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



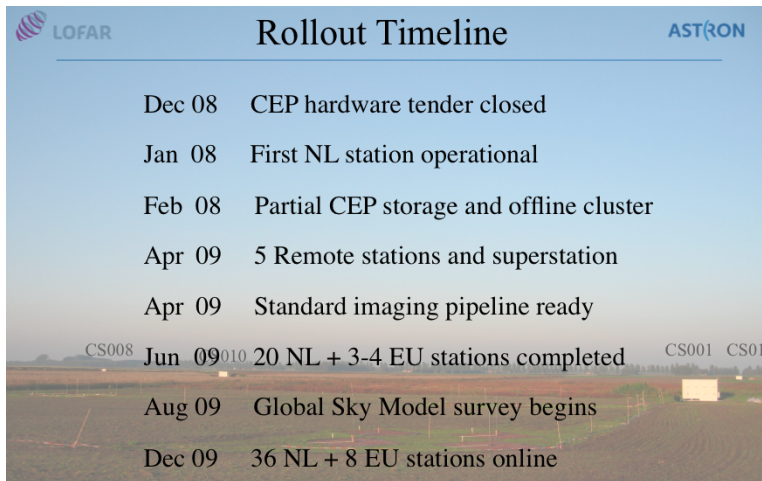


Program outline

- 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



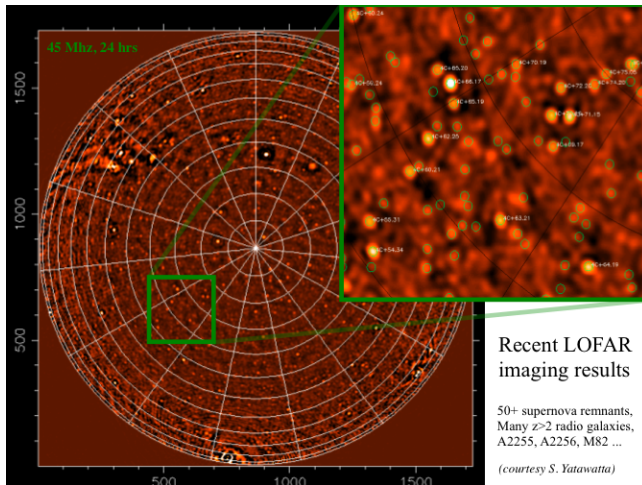
LOFAR project timeline



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

synchrotron

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

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

coherent

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

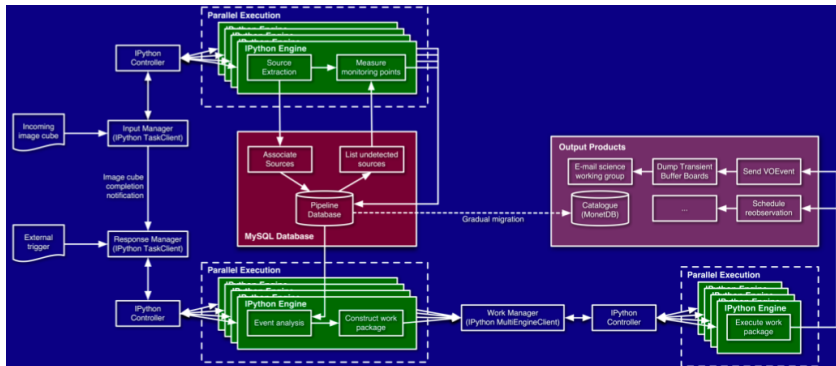
Search all LOFAR observations with our automated tools (*Tuesday afternoon*)

Ref: Rob Fender



The LOFAR transient detection pipeline

- John Swinbank (tkp08-swinbank.pdf)
- <http://www.transientskp.org/workshop/schedule>





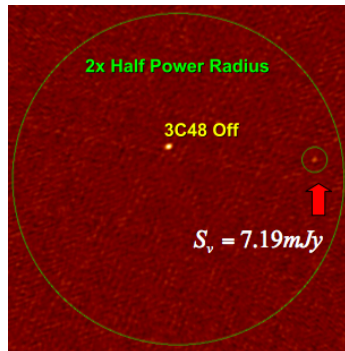
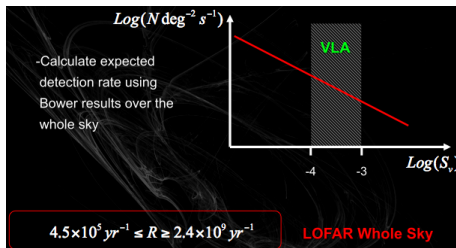
The LOFAR transient detection pipeline

- 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 ($> 10\times$)
- “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:
 - SUMSS – *Mauch et al. 2003, MNRAS, 342, 1117*
 - MGPS-1, MGPS-2 – *Murphy et al. 2007, MNRAS, 382, 382*
- Aim to add limits to Bower snapshot rates analysis

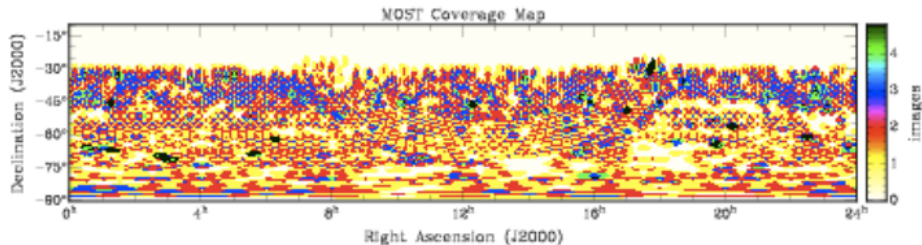


Image ref: Keith Bannister (USyd)





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 :)

