Transients with eROSITA and AMI-LA

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Radio emission from astrophysical transients has become increasingly important over the past decade. It has the potential to address questions which are difficult or impossible to tackle at other wavelengths, most obviously as a direct estimator of the kinetic feedback from the transient event. These events may be variously stellar explosions (SNe and GRBs), accretion events (X-ray binaries, Cataclysmic Variables, Tidal Disruption Events) or even, as recently demonstrated, the merger of two neutron stars.

AMI-LA is a compact radio array in Cambridge UK, operating in the ~16 GHz frequency band. While its original (and partially ongoing) purpose was to work on foreground sources for CMB experiments, it spends ~30% of its observing time per annum on the transients programme led by R Fender (Oxford). Typical r.m.s. in a 4hr observation is 0.05 mJy (varies with conditions quite a lot at these frequencies).

This programme has two aspects:

1. ALARRM The AMI-LA Rapid Response Mode is a robotic response to well-localised *Swift* GRBs, and is the only robotic radio override programme operating on any major radio array. The system is described in Staley et al. (2013), and while the original plan was to focus on GRBs (see results in Anderson et al. 2014, 2017b) there have been other unexpected highlights such as X-ray and radio flaring from nearby dwarf stars (Fender et al. 2015) and very early-time response to the black hole V404 Cyg in outburst (Fender et al. *in prep*).

2. Ad-hoc programme Most of our observing time on AMI-LA is as part of our ad-hoc programme in which we are able to request observations of a range of astrophysical transients and variables into the (flexible) scheduling system. This has resulted in a large number of important observations and monitoring programmes, including V404 Cyg (the best radio coverage *ever* of a BH XRB in outburst), the discovery of weak radio emission from a thermal TDE 14 li (which led to van Velzen, Anderson et al., *Science*, 2016), the discovery of rapid bright radio flares from the CV SS Cyg (Mooley et al. 2017), the discovery of multiple episodes of mass-loss prior to supernova in SN 2014C (Anderson et al. 2017a).

I would like to propose a collaborative programme between AMI-LA and eROSITA in the field of transients. AMI-LA should be able to respond rapidly to any transients north of ~Dec -10, and provide higher cadence monitoring of relatively bright objects (>0.1 mJy at 16 GHz) than will be possible with more powerful arrays such as JVLA. I would anticipate this will include XRBs, TDEs, CVs, ULX and possibly also GRB and other stellar explosions.