

Software Management Plan for Lasair

What software will you develop?

- We will develop a web service, called Lasair, which ingests high-bandwidth streams of transient astronomical observations and filters out the interesting substreams that can advance science, as well as adding useful additional information.
- There is an advanced prototype (lasair.roe.ac.uk) that serves the ZTF survey, and a new version will serve the LSST survey when it starts in 2023.
- Lasair is composed of a set of ingestion modules, coordinated via a Python script, with web pages, web services and Kafka services. Lasair is built with the following high-level components:
 - web/kafka server,
 - ingestion service,
 - database,
 - Jupyterhub
 - context classifier.
- These services are built from third-party tools: Apache, Django, Kafka, Jupyter, MySQL, Anaconda, plotly, jQuery.

Who are the intended users of your software?

- The Lasair system is open to the public, but we focus on professional astronomers in the UK.
- Users wish to extract what their science wants from a wide and diverse stream of astronomical transients.
- There are three levels of authentication: public and free, self-signup, and EGI checkin. The second requires only a valid email address; the last uses the user's own identity provider (e.g., university credential).
- We are also building a "citizen science" project to identify super-luminous supernovae.

How will you make your software available to your users?

- The Lasair software is available open source from github [<https://github.com/lst-uk/lasair>], if anyone would like to replicate the system.
- However, we do not expect many users to run the software themselves; rather they will access an instance of the software that we will run on their behalf.
- The system presents as a website at which filters and queries can be built by users; these can be executed in "pull" mode where a user (or API) makes a request, or where interesting observations are "pushed" to the user as soon as possible.

How will you support those who use your software?

- We will build documentation in many forms: quickstart, how-to as text and video, FAQ, etc.
- Channels available to users will be: email to helpdesk, Slack channel, github issues
- Those who have accounts with Lasair may get occasional emails about upgrades / new releases.

How will your software contribute to research?

- The Lasair system will enable astronomers to get what they want from a billion-dollar science project (LSST), by filtering and storing the firehose of data.

- Specifically, Lasair will improve understanding of supernovae, active galaxies, stellar outbursts, planet formation, and solar system objects.

How will your software relate to other research objects?

- Lasair is useful only because it consumes an astronomical survey (ZTF, LSST), which is itself a large software infrastructure combined with a large telescope.
- Lasair is described in Smith, Williams, et. al, <https://iopscience.iop.org/article/10.3847/2515-5172/ab020f>

How will you measure your software's contribution to research?

- The web page asks users “If you make use of this, please cite our paper:...”
- The web page also asks users “If you use this service for science, please use the Acknowledgment at the bottom of this page.”

Where will you deposit your software to guarantee its long-term availability?

- The scripts that can configure and deploy an instance of Lasair, are held on the third-party GitHub service, which we expect will persist for the long term, due to the volume of important software that it hosts.