Working with Fink

How to personalise your experience

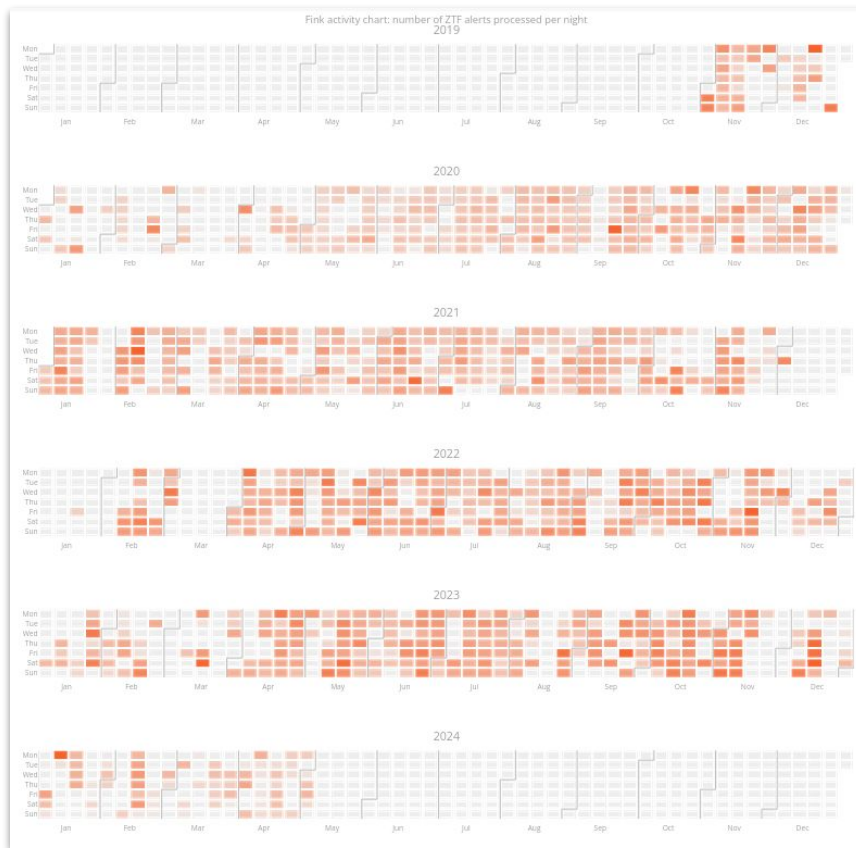Julien
2024/05/06

1000+ observing nights!

Fink in operation since **Nov 2019**

1,065 ZTF observing nights processed
- 225 million alerts received
- **150 million alerts processed**
  - 40% galactic
  - 15% solar system
  - <% extra-galactic

LSST will add 1 to 10 million alerts per night!

All Fink data is world-public

Fink activity chart: number of ZTF alerts processed per night

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Alert content

Alerts based on **Difference Image Analysis**

Alert contains typically (based on ZTF)
- Information about the new detection (magnitude, position, ...)
- Neighbours information (Gaia, Panstarrs)
- Historical information if the object has been seen previously
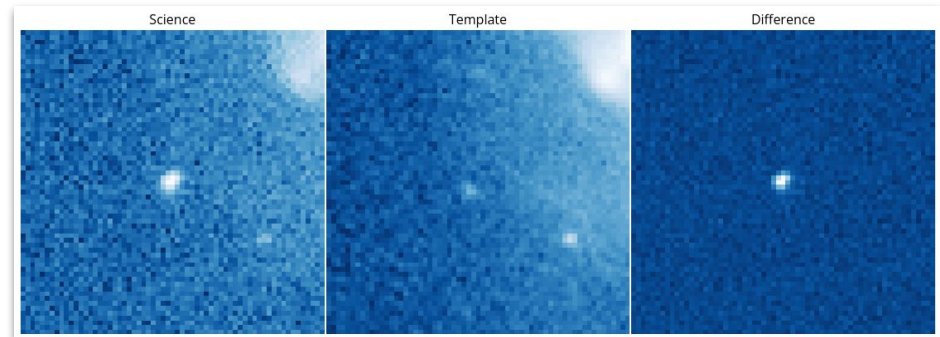- Small images around the detection (60x60 pixels)

LSST alert content will be similar: https://github.com/lsst/alert_packet

*Each measurement is from an **alert***
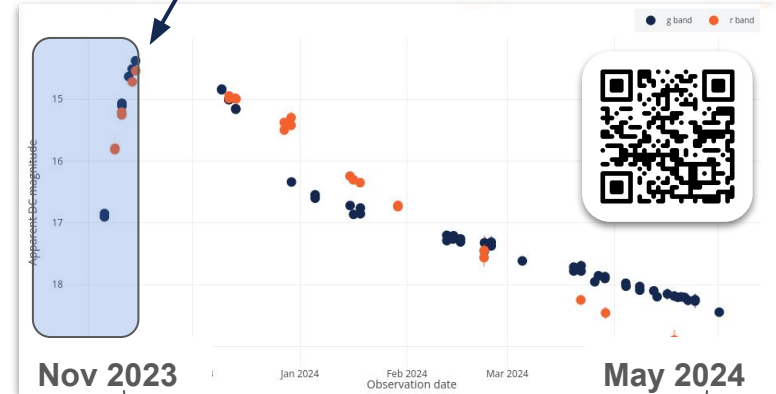
*All the measurements form an **object***

Open data is not enough

Alert data is world-public, but
- Data flows in real-time: *require continuous attention*
- Data is useful after its initial usage: *storage always increases*
- Rate is big: *one human is not enough to look at all alerts*

The role of Fink, as a broker, is to provide assistance in dealing with this data
- From alert reception, online analysis and redistribution to long-term storage
- From visualisation and offline scientific analysis to publication

We do this in the form of a set of services: *backend* (hidden from you), and *frontend* (user-facing).

Real-time workflow

The basic real-time workflow in Fink is:

- **Add value to each event**: *Fink science modules*
  - From crossmatch to machine and deep learning
  - Joining streams (e.g. ZTF x LVK)
- **Select interesting events**: *Fink filters*
  - From simple booleans to more complex decision processes
- **Notify users**
  - From basic Fink bots (Slack & Telegram) to integration with bigger frameworks (TOM toolkit, SkyPortal, Astro-colibri)

As quickly as possible.
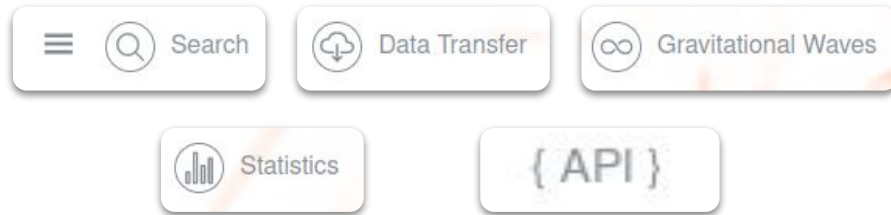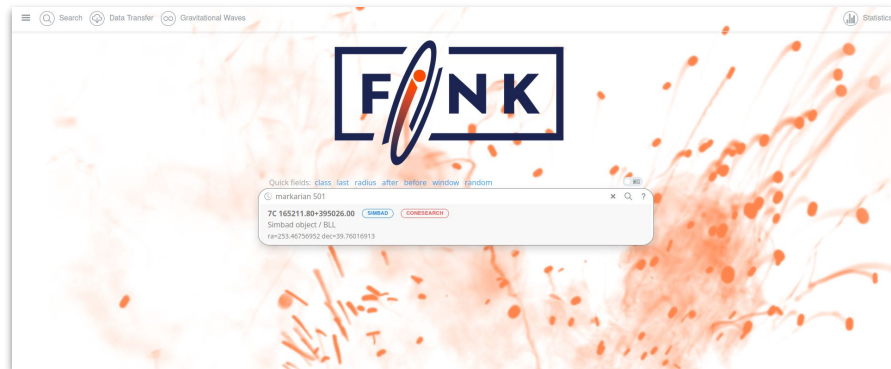In principle, before the next exposure (< 1 min)

Offline analysis

We also store all received alerts

- **Event database** for simple queries and visualisation (*Search*)
- **Data lake** for exotic queries and bulk download (*Data Transfer*)

Additional services for GW counterparts and aggregated statistics.

Web interface and REST API available

Tutorials (~3h)

Introduction to Fink tools		*Dr Julien Peloton*
Centro Brasileiro de Pesquisas Fisicas		15:45 - 16:15
Mini-break		
Centro Brasileiro de Pesquisas Fisicas		16:15 - 16:30
Offline analysis: Search		*Dr Julien Peloton*
Centro Brasileiro de Pesquisas Fisicas		16:30 - 17:00

Monday: offline analysis (Web)

Offline analysis: REST API		*Dr Julien Peloton*
Centro Brasileiro de Pesquisas Fisicas		15:45 - 16:15
Mini-break		
Centro Brasileiro de Pesquisas Fisicas		16:15 - 16:30
Offline analysis: REST API		*Dr Julien Peloton*
Centro Brasileiro de Pesquisas Fisicas		16:30 - 17:00

Tuesday: offline analysis (API)

Real-time analysis: filters & bots		*Dr Julien Peloton*
Centro Brasileiro de Pesquisas Fisicas		14:00 - 14:45
Mini-break		
Centro Brasileiro de Pesquisas Fisicas		14:45 - 15:00
Real-time analysis: science modules		*Dr Julien Peloton et al.*
Centro Brasileiro de Pesquisas Fisicas		15:00 - 15:30

Thursday: real-time analysis (science modules, filters, bots)

Search

Where: https://fink-portal.org

Data provenance: ZTF (LSST) alert data only

Data availability: end-of-the night

Pros: Visualisation of alerts & objects, daily inspection, automated workflows

Cons: new data available ~12h after the observing night, only allow simple queries

Documentation: https://fink-broker.readthedocs.io

Code source: https://github.com/astrolabsoftware

Alert history: what sees a classifier

https://fink-broker.readthedocs.io/en/latest/science/classification