



Status and recent results

[Previous reporting](#)

Julien, Emille, Anais, on behalf of the Fink team
29/11/2022



Rubin time-domain challenges

The Rubin Observatory will send about **10 million alerts per night over 10 years**

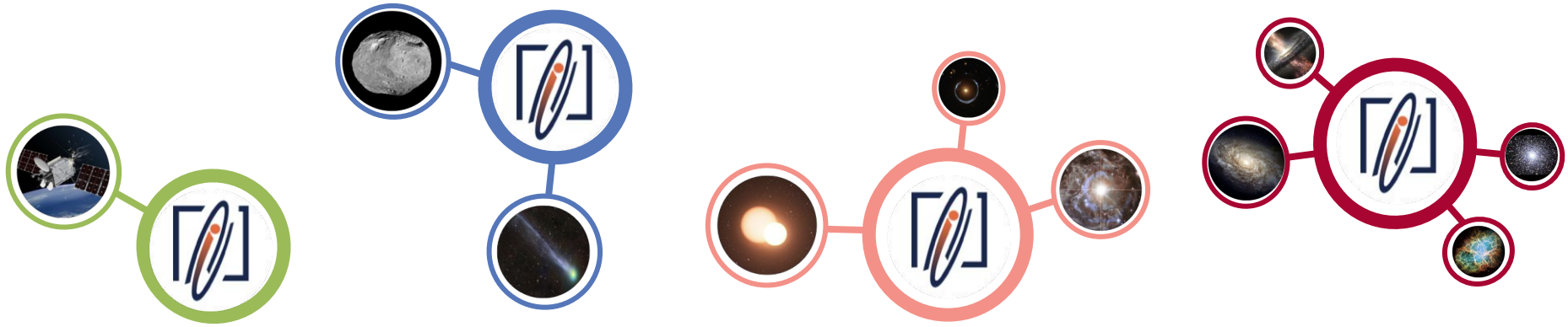
- Several orders of magnitude above current streams
- Current tools do not scale (~1TB / night)

Individually, each observatory of the next decade will not characterise all of its events

- Additional observations will be necessary, and often within a short time delay after initial discovery
- The need for **multi-messenger astronomy** is rising fast

 Follow-up resources will be crucial but limited!

Turning information into science



Alert information solely is not enough – we need experts to extract the science!

- More than 30 scientists worldwide contribute to the project.

Our ambition is to **study the transient sky as a whole**, from solar system objects to galactic and extragalactic science.



Ongoing science projects



Satellites – arxiv:2202.05719



Solar System Objects – MITI grant – Rubin x Euclid



Variability in our Galaxy – Fink hackathon in Nov 2022



Young Stellar objects – COIN residence in Sept 2022



Microlensing effect – see Petro’s talk



Kilonova – arxiv:2202.09766,2210.17433 – see Biswajit’s talk



AGN – arxiv:2211.10987 – see Etienne’s talk



Supernovae & Core-collapse – arxiv:2111.11438 – see Marco’s talk



Pair-instability Supernovae – MITI grant – see Etienne’s talk



Orphan GRB – see Marina’s talk



+ Multi-messenger analysis, Anomaly detection, and others!

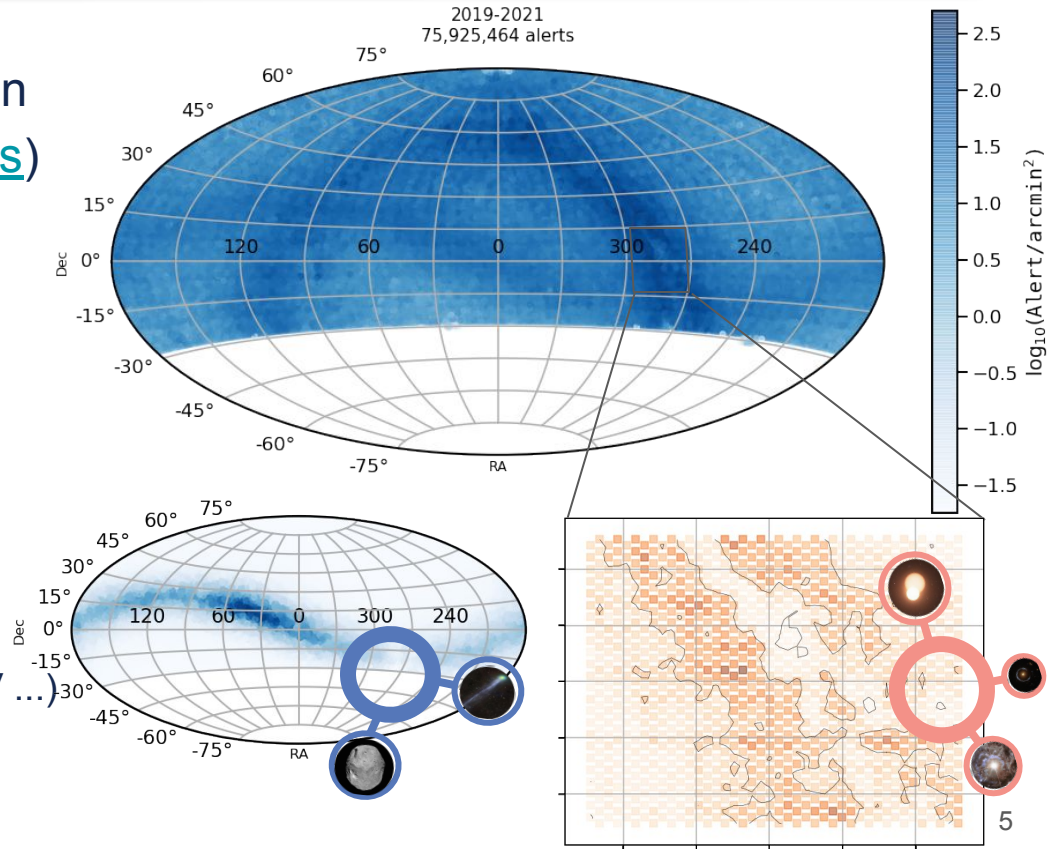
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ZTF/Fink statistics

163 million alerts received, 110 million processed (<https://fink-portal.org/stats>)

Typical nightly rates (200,000 alerts):

- ~75,000 known variable stars
- ~25,000 known SSO
- ~100 new SSO candidates
- ~100 new supernovae & core-collapse candidates
- ~10 (un)identified satellite glints
- ~5 new SN Ia candidates
- ~1 fast transient candidate (KN, GRB, CV ...)
- ~1 new microlensing candidate



Fink services

Entry points for users:

- Live streams (Kafka streams)
 - Personalisable filters to select objects/parameters of interest
 - Data received “live” (+processing delays)
 - <https://github.com/astrolabsoftware/fink-client>
- Science Portal & REST API
 - All data will remain accessible for the full survey duration
 - <https://fink-portal.org>
- TOM module
 - https://github.com/TOMToolkit/tom_fink
- Statistics information:
 - <https://fink-portal.org/stats>



Recent (in-person) events

May 2022: [Fink collaboration meeting 2022](#)

- Focus on science & hands-on sessions

Nov 2022: [Fink hackathon 2022](#)

- Focus on several hot-topics for Rubin!
 - Fast transients
 - Variability in our galaxy
 - Multi-class classifiers
 - Web tools
 - Graph database
 - Eating raclette

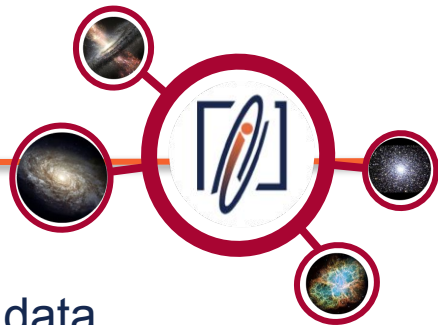


2022 Fink Hackathon

19-26 November
Grimenz, Switzerland



Preparing for Rubin



LSST-DESC ELAsTICC (see Emille's talk)

- Broker challenge, but also opportunity to deal with LSST-like data
 - Streaming period: September - December. +30 million alerts.
- Several science teams within Fink participate.

Example of *federating action*: preparing the ground for GRB science

- Regular meetings organised by Johan (LPSC) – [link](#)
- Theory meeting observations!

Example of follow-up partnerships

- GRANDMA network for fast transients follow-up (O4 preparation and beyond)
- Ground-based segment of SVOM for fast follow-up of Fink sources
- IFU spectrograph + NIR photometry (Siding Spring Observatory)

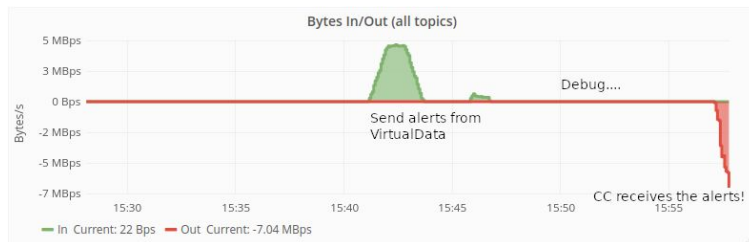


CC-IN2P3 deployment

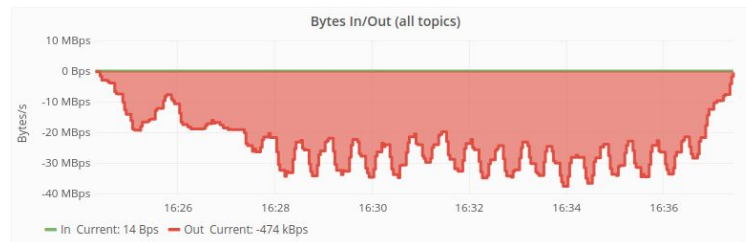
Deployment (part#1) of Fink at CC-IN2P3: almost complete!

- Prototype @ VD has been replicated (Adrien Ramparison, IJCLab)
- Performance tests have been done
- Kubernetes deployment ongoing (Fabrice Jammes, LPC)

From first sign of life...



... to LSST rates!



ACME

The Horizon Europe Work Programme 2023-2024 foresees a call for “Research infrastructure services advancing frontier knowledge” proposals.

- providing **trans-national access** (on-site or remote) and/or virtual access to integrated and customised RI **services for curiosity-driven research**.

Several online meetings since August 2022 + [MMAW @ EGO](#).

- Proposal: *Astrophysics Centre for Multimessenger studies in Europe*

The *EuroBroker* initiative (AMPEL/Fink/Lasair) spoke as a common voice

- WP: *European real-time alert distribution network*
- “Work together to optimise the scientific platform for users throughout the EU and the world to exploit LSST’s tremendous potential for transient and multi-messenger astronomy.”





<https://fink-broker.org>

<https://fink-portal.org>

How Fink works?

Operating in real time on large cloud computing infrastructures. Deployed at VirtualData since 2019, and now migrating at CC-IN2P3 (IN2P3 LSST Master Project).

