Le broker Fink et ses implications pour les analyses multi-messagers

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On behalf of the Fink collaboration

Rubin First Light
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Fink is....

Fink is a broker serving the scientific community by **ingesting, classifying, filtering, and redistributing** alerts from large optical surveys.

Fink (2019 –)

Operating 24/7 since 2019, serving 100+ unique users per day (scientists & follow-up facilities).

- Real-time components (10^5+ event/night)
- Event database (~1B entries)

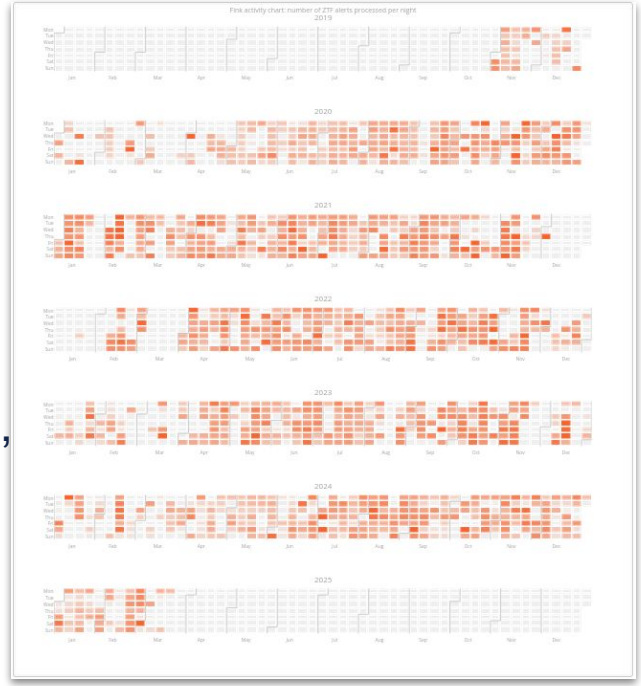
Processing the ZTF alert stream since 2019

- 280 million ZTF alerts received
- ⅔ is classified: 50% galactic, 15% Solar System, few% extra-galactic
- Coupled to GCN: Fermi, Swift, Icecube, LVK

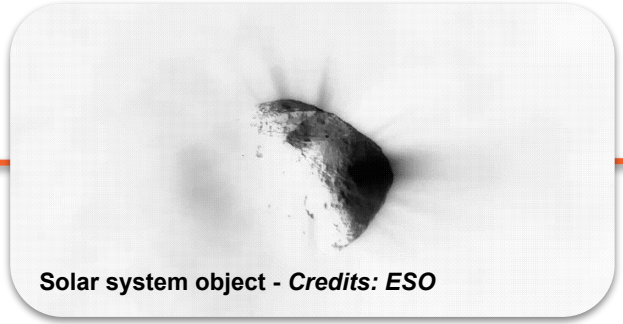
Community-driven: scientists bring building bricks

- 80+ members, 15+ scientific topics covered

Observing schedule



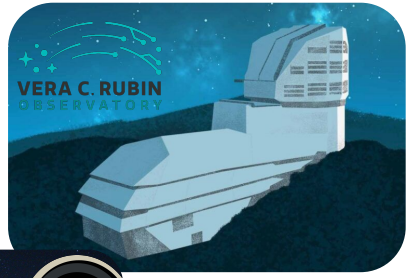
What do we do?

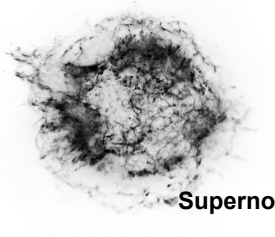

Solar system object - *Credits: ESO*

Scientific roadmap is completely open

- Satellites & debris detection
- Solar System science
- Galactic science: microlensing events, cataclysmic variables, YSO…
- Extra-galactic science: supernovae, gamma-ray bursts, blazars, kilonovae, tidal disruptive events, …
- Anomaly detection, hostless transients, …


Active Galactic nucleus




Supernova


Tidal disruptive event

E.g. 2,798 SN candidates sent to TNS, 1,259 classified (1,028 SN Ia)

MMA selected examples

Fink-MM - Extending Fink for real-time MMA

- Joining GCN notices & optical alerts in real-time
  - Incl. neutrino, GRB, GW, …
- *PhD thesis R. Le Montagner (IJCLab)*

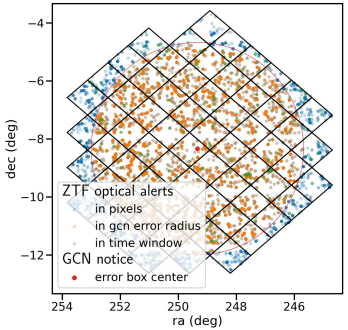
(Orphan) Kilonova: fast transients with GRANDMA

- Several observing campaigns
- Links with amateur astronomers (KNC)

Blazar: Combination of optical and gamma-ray surveys to tackle the challenge of blazar variability

- Joining Rubin & CTAO observations
- *PhD thesis J. Hamo (IJCLab)*

ACME: EuroBroker initiative. Connection with downstream projects such as Astro-COLIBRI.



Fermi notice with ZTF optical alerts Le Montagner 2024, PhD thesis

The challenge, for each science case, is to reach 99.9999+% rejection!

"Your contaminant is my gold"

Some challenges/questions

- Rubin cadence: fast transient science?
- Rubin depth: who can follow?
- Interoperability: how to efficiently connect everyone to everyone?
- Informatisation: what level of abstraction?
- French community: how to leverage the fact that Fink operates in France?

https://fink-broker.org