



Fink status

26/05/2021

Emille Ishida, Anais Möller and Julien Peloton
on behalf of the Fink Team



Fink & Rubin

Fink is a broker designed to enable science from the large alert streams of the Legacy Survey of Space and Time.

We are community driven, and our focus is on several aspects of the Transient Sky. Current research topics are:

- Solar system: asteroids & comets
- Galactic: variable stars, microlensing events
- Extra-galactic: supernovae
- Multi-messenger: kilonova, GRB

We are participating to the Rubin Observatory call to become one of the official broker (15 participants).



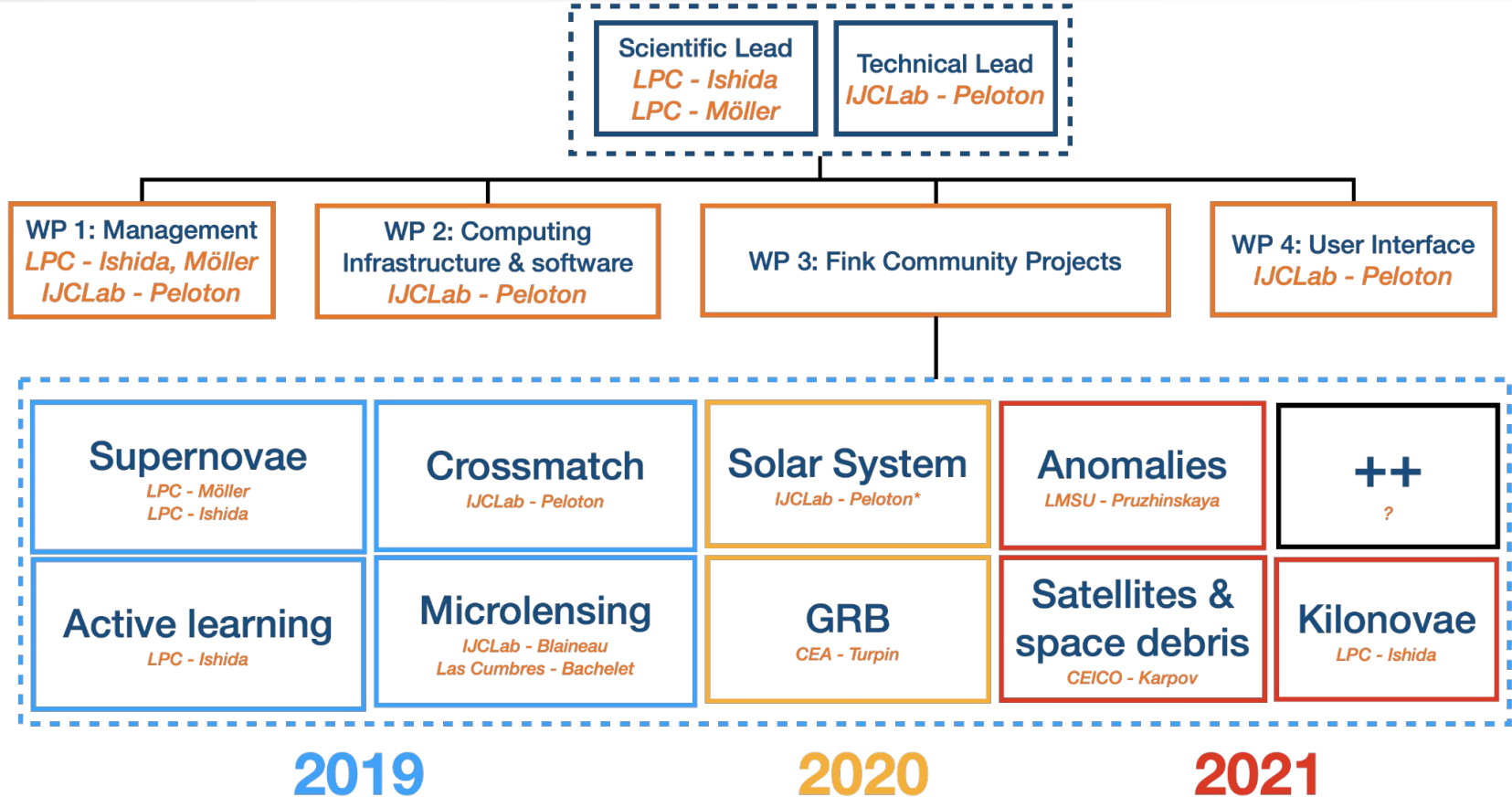
Fink is 2 years old!

2 years ago, we were writing the Letter of Intent for LSST... A lot happened since then!

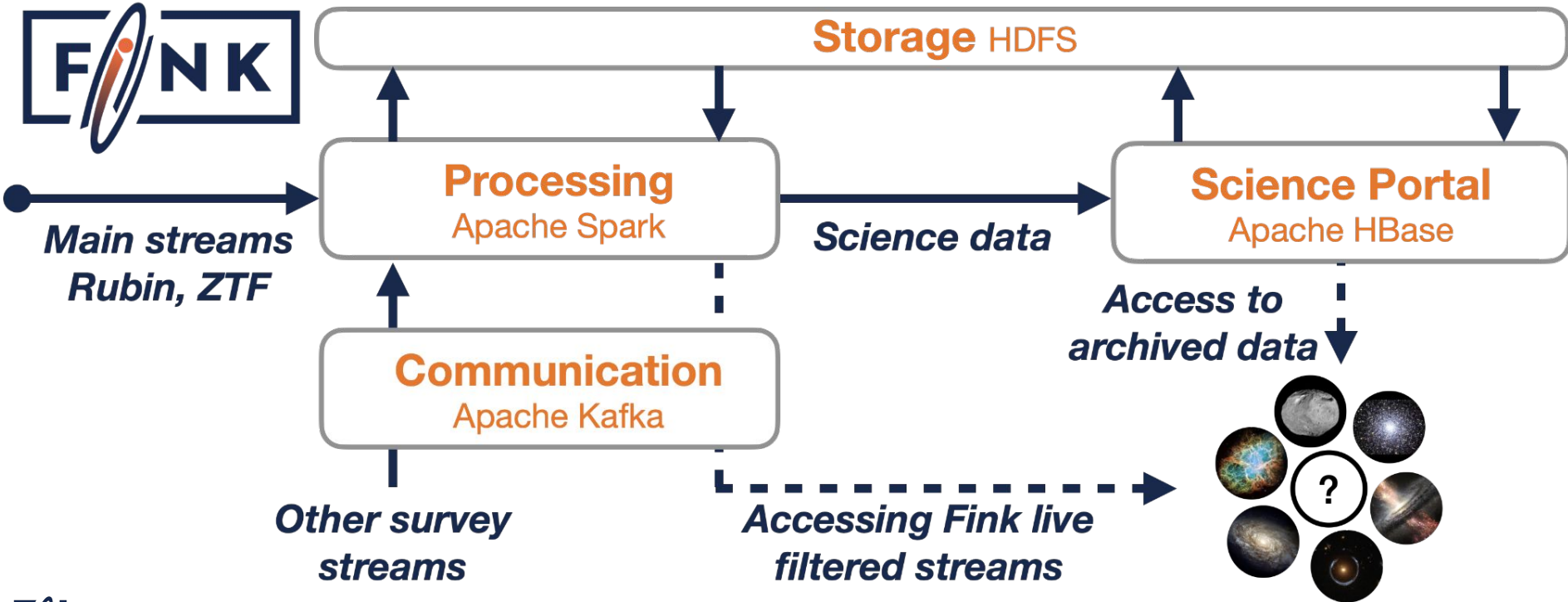
- **Aug 2019:** pre-selection by the Rubin Observatory
- **Feb 2020:** MoU with ZTF-I
- **Oct 2020:** renewal of MoU with ZTF-II (2020-2023)
- **Oct 2020:** Organisation of LSST broker workshop part 1
- **Nov 2020:** Publication of Fink white paper (MNRAS)
- **Nov 2020:** Fink becomes IN2P3 project (LSST Master project)
- **Dec 2020:** Submission of Full Proposal to the Rubin Observatory
- **Feb 2021:** Joint proposal on CFHT with GRANDMA for Kilonovae search
- **Apr 2021:** Organisation of LSST broker workshop part 2
- **May 2021:** Citizen science Kilonova-Catcher project with GRANDMA



Fink current organisation



Fink in action

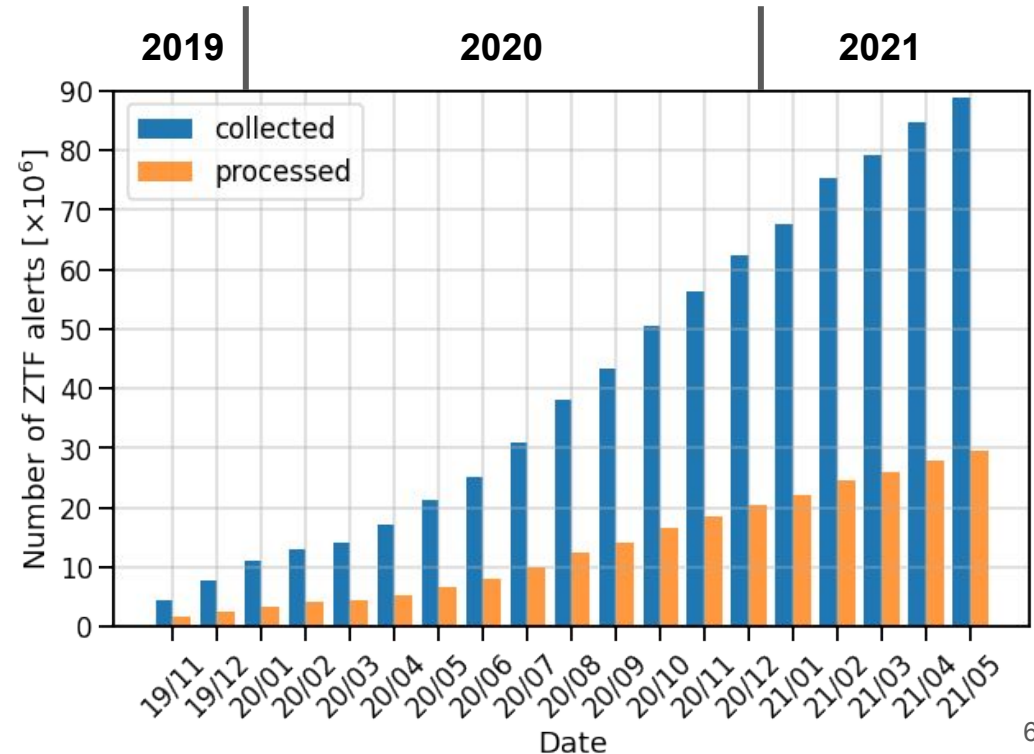


Data ingestion

Since November 2019, we collect and process ZTF alerts (public stream)

- **~90 million alerts collected** (~200k alerts/night)
 - Database of about 4TB
- **~30 million alerts processed**
 - More than 100 different labels available
- Fink quality cuts are conservative

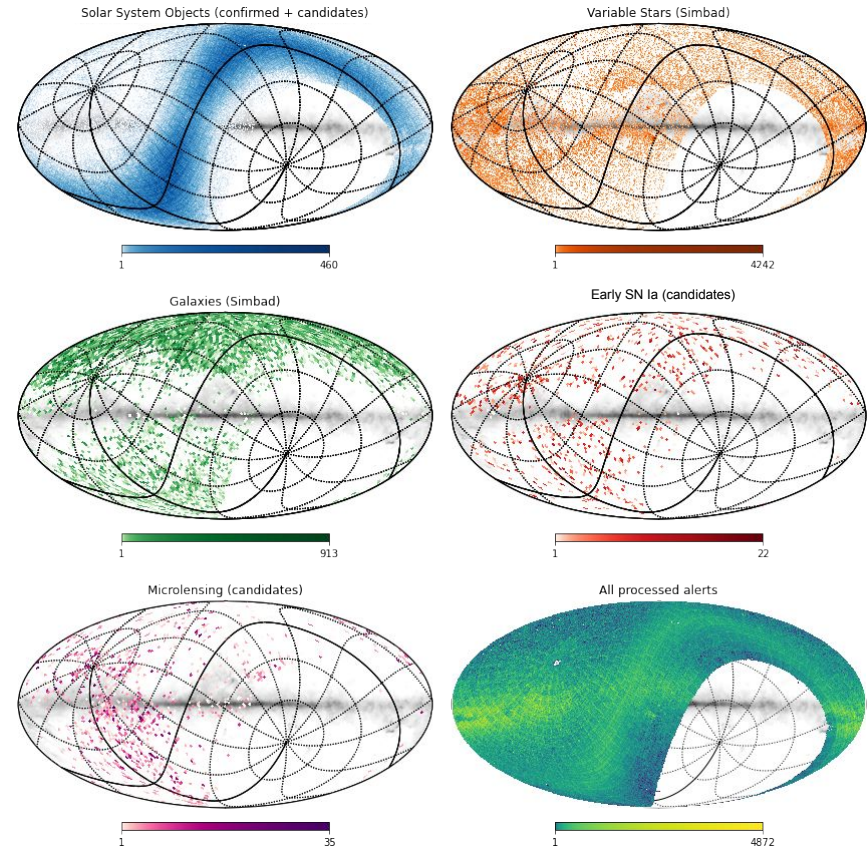
Cumulative number of ZTF alerts by Fink



Fink science

Several science modules & filters

- **Supernovae:** About 2/night new SN Ia candidates, and 1/night shown to be SN Ia (spectro). Work in LSST-DESC.
- **Solar system:** ~10k/night known SSO (MPC), ~100/night new SSO
- **Kilonovae:** ~1/night kilonova candidate. Work with GRANDMA.
- **Microlensing:** ~0.5/night candidate, some potential real events
- **GRB:** dozen of candidates the first year (no confirmation). Work with SVOM.
- **SIMBAD:** ~30k/night alerts with position match (galactic & extra-galactic)



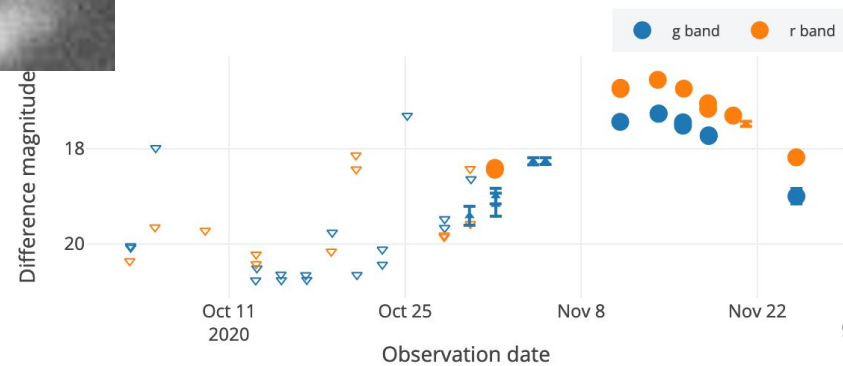
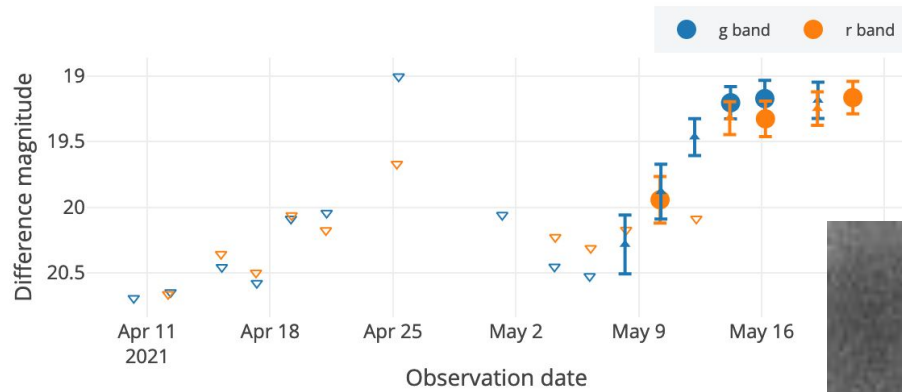
How to access Fink data?

You have 3 main ways to access Fink data:

- **Livestreams (need auth)**
 - Live streams based on one or several of the alert properties (label, classification, magnitude, ...). See [fink-client](#).
- **Science Portal (public)**
 - Web application to explore Fink aggregated data (~40 million alerts). See <http://134.158.75.151:24000/>.
 - REST API available
- **TOM toolkit (public)**
 - TOM module for Fink. See [tom_fink](#).



Gallery





Discussion: Getting ready for LSST data

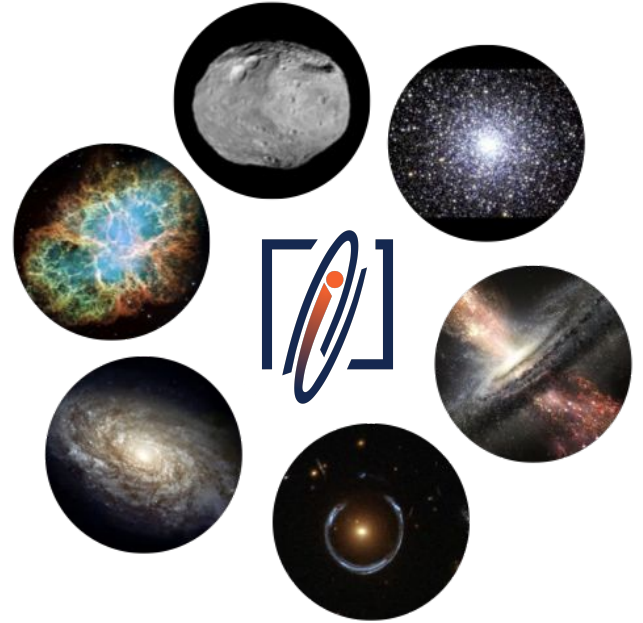
LSST France - 26 May 2021



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Fink is ready to boost your science!

- Current available capabilities
 - Early supernova
 - Kilonovae
 - Microlensing
 - Cross-match with CDS, TNS, MPC
 - Sky portal visualizations
- Under development:
 - Solar System Objects
 - Anomaly detection
 - Space debris



On ZTF data

<https://fink-broker.org/joining.html>

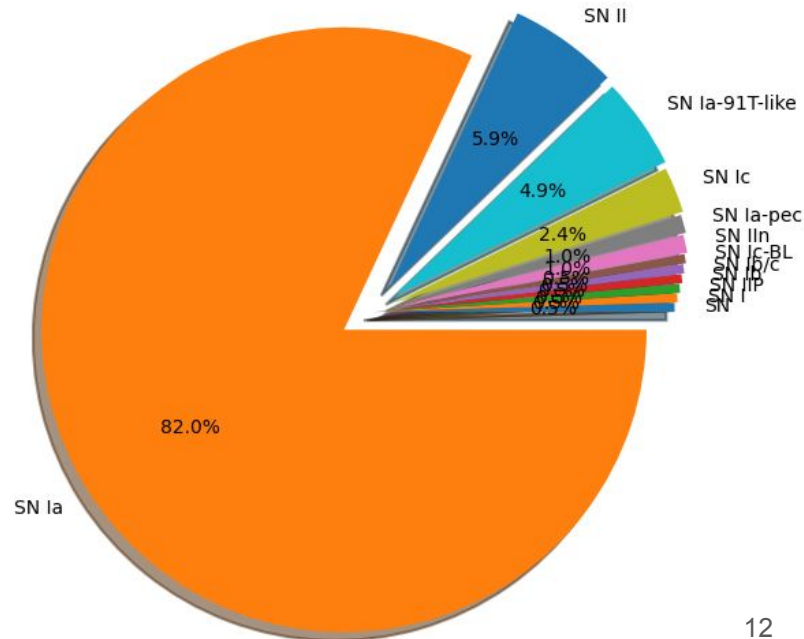


Example: Early Supernova

Since 2020/11:

- Each night, we submit *Early SN Ia* candidates to TNS for spectroscopic follow-up
 - The submission is done via bot
 - No human inspection required
- As of 22/03/2021, 310 candidates were submitted (about 2/day)
- As of 22/03/2021, 205 candidates were classified as SN (about 1.5/day)
- As of 22/03/2021, 168 candidates were shown to be SN Ia (about 1/day)
 - **1/2 candidate shown to be SN Ia**
 - Not complete sample

All SN classified since 2020/11
(82% purity)



Engaging LSST France community

- Science cases which will help us prepare for commissioning
- Possibilities:
 - Build a science module
 - Use the output of the science modules and filters already in place

Fink was designed to allow easy implementation of very specific science needs...

... do not be afraid to be creative!

- Form proposal: <https://fink-broker.org/joining.html>
- Email: contact@fink-broker.org



Coordination & interoperability

Identifying interesting LSST alerts is only part of the story: we need coordination with other facilities, follow-up resources and existing networks.

- Discussions and work with teams from: SVOM, GRANDMA, CTA, Integral, KM3NET, ...
 - Work on GRB (Fermi/SWIFT-ZTF) to prepare SVOM-LSST
 - GRANDMA (network & follow-up for KNe)

We will regularly publicize a prioritized list of targets for each science case that should be followed in order to improve future estimates.

- How to integrate this in the current landscape given the scale?
- How to coordinate with existing follow-up resources (+ToO) and surveys?



Food for thought

- Fink is adding value to ZTF data
- Our main goal is to provide support for the LSST-France and European communities
- What are the capabilities you would like to see ?
- Do you foresee any connections with experiments or communities not currently being tackled?

We welcome your feedback at any time: contact@fink-broker.org

