Astro-COLIBRI

COincidence **LIB**rary for **R**eal-time **I**nquiry for multi-messenger astrophysics





Bernardo Cornejo, Fabian Schüssler, Ilja Jaroschewski, Mickäel Costa, Weizmann Kiéndrébeogo

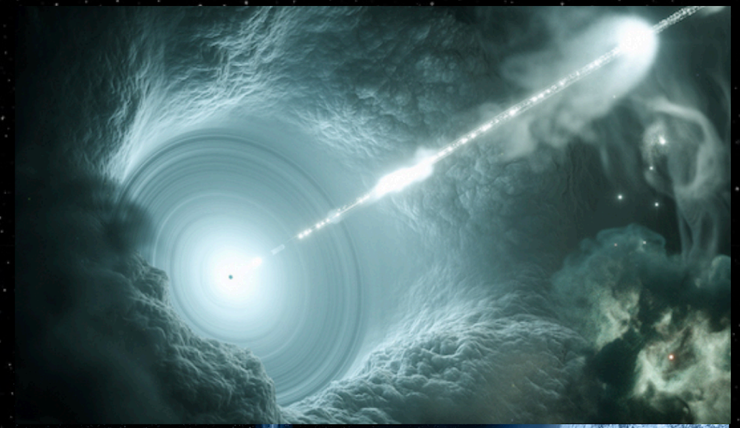
CEA Paris-Saclay, IRFU

The app for real-time follow-up of transient sources

What are transient sources?

Rapid temporal phenomena which can last from seconds to days.
The most energetic events in the Universe, including :

- Supernovae
- Novae
- Tidal Disruption Events (TDE)
- Gamma-Ray Bursts (GRB)
- Active Galactic Nuclei (AGN)
- Fast Radio Burst (FRB)
- Binary compact objects collision (Neutron star, Black Hole)
- Many others...



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Electromagnetic waves in every wavelength

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Neutrinos, Cosmic Rays, Gravitational Waves

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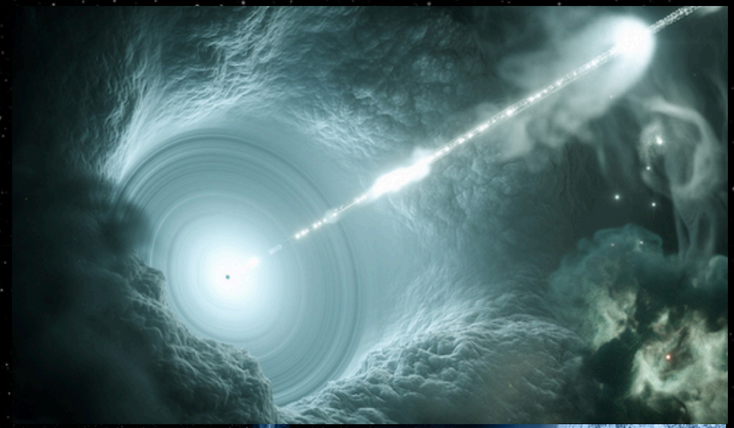
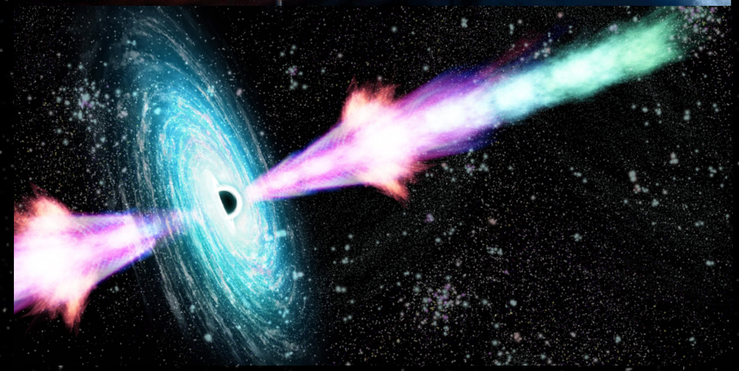
Multi-Messenger & Multi-Wavelength Astronomy

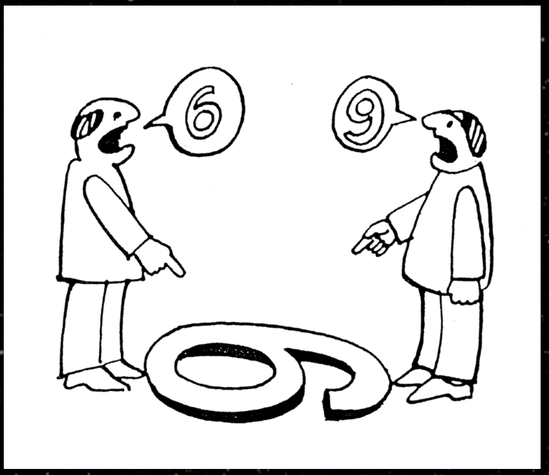


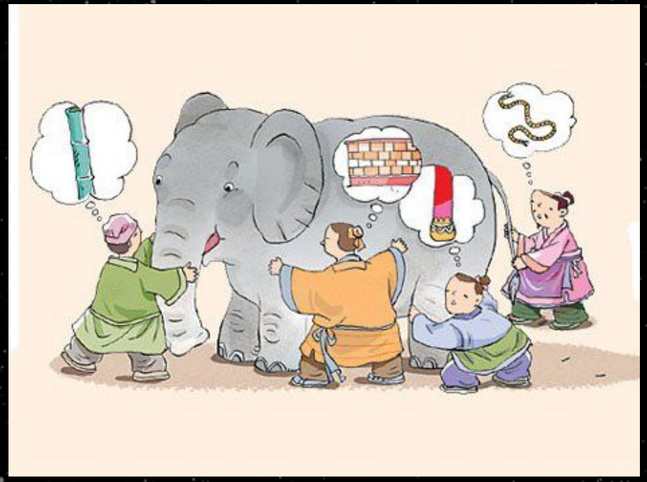


Multi-messenger astronomy

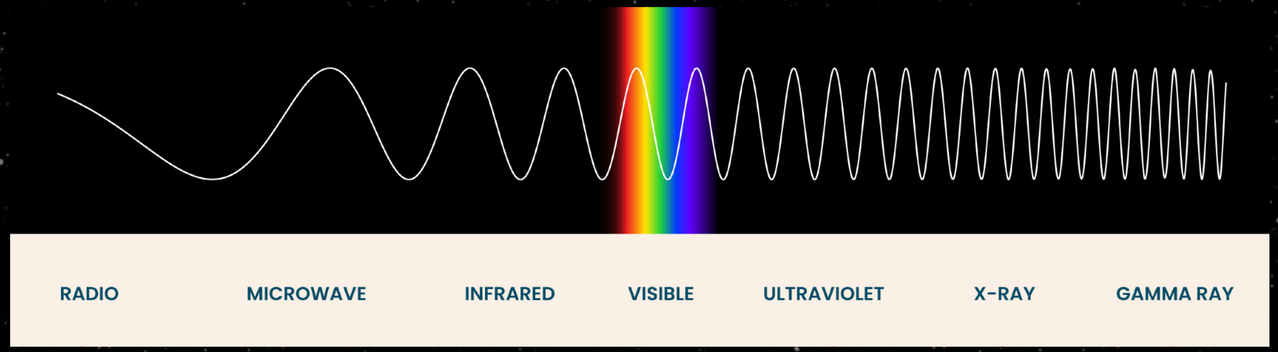
To gather all possible information of a source in order to have a complete picture.

More information allows better modeling and understanding of the event and the processes involved.





How to observe transient sources?

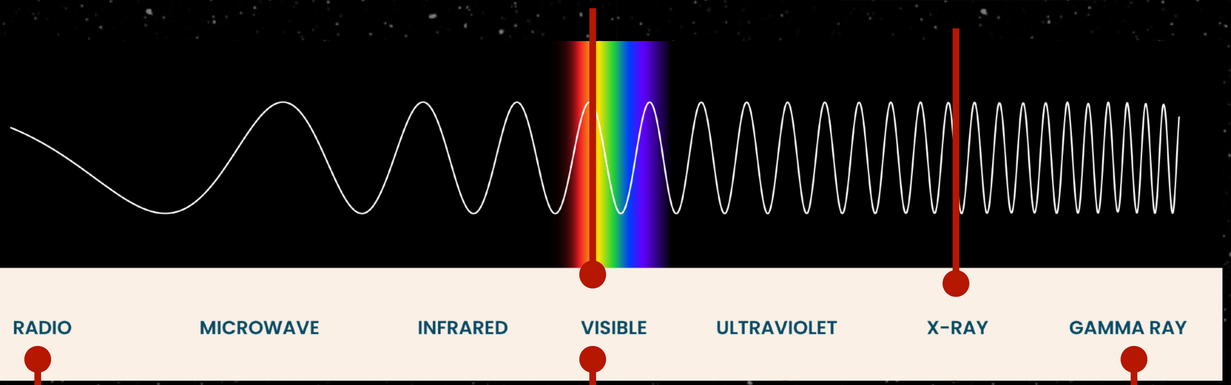


How to observe transient sources?

Wide Field-of-View (FoV) Observatories

Gaia

Swift-XRT



CHIME

Vera Rubin / LSST

LHAASO

All-sky surveys but with low resolution in position and energy

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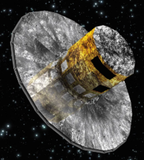

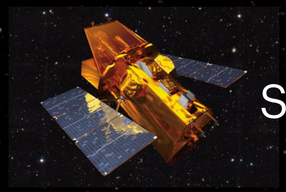

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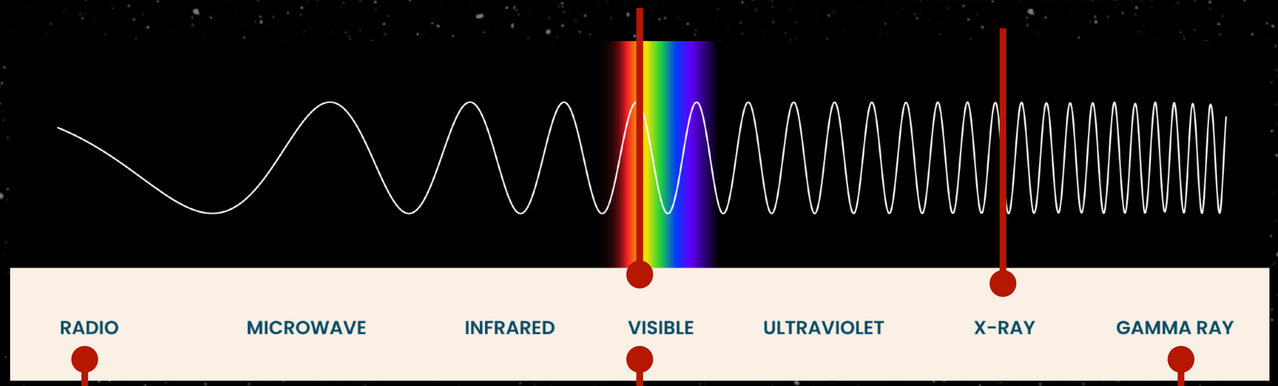

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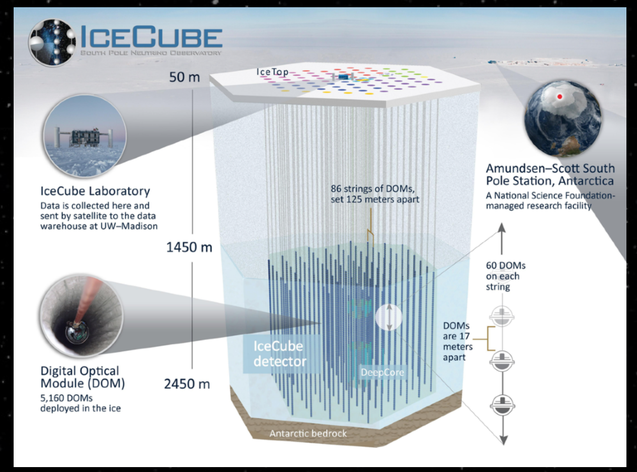


IceCube

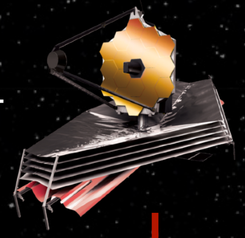
Ligo/Virgo/Kagra

How to observe transient sources?

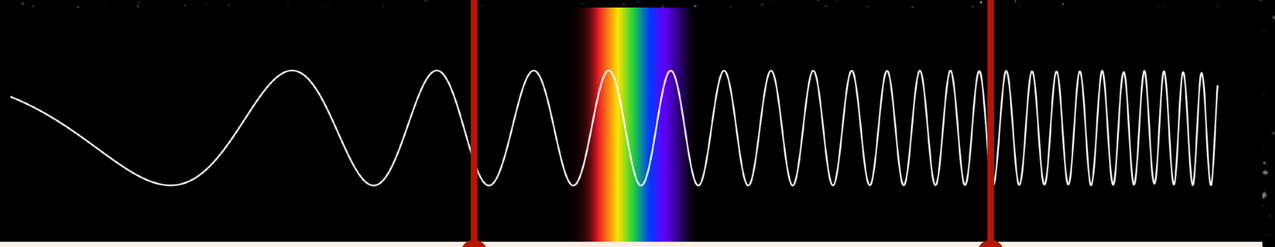
Pointed Observatories

High resolution but small sky coverage

JWST



Chandra

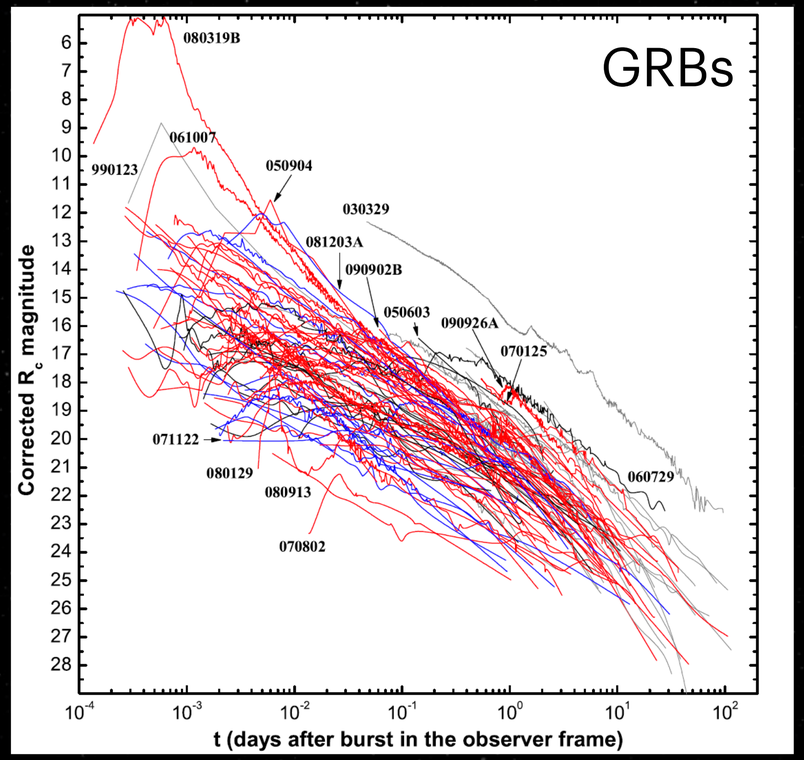


Parkes

VLT

H.E.S.S.

Why do we need rapid follow-ups?



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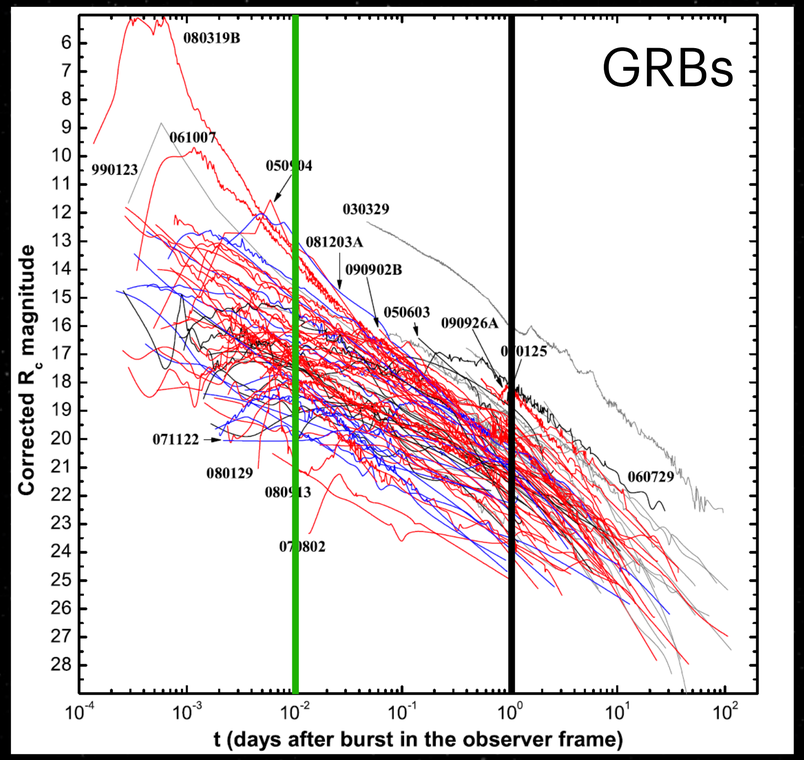

For these events:

Important to catch the first minutes, hours, days

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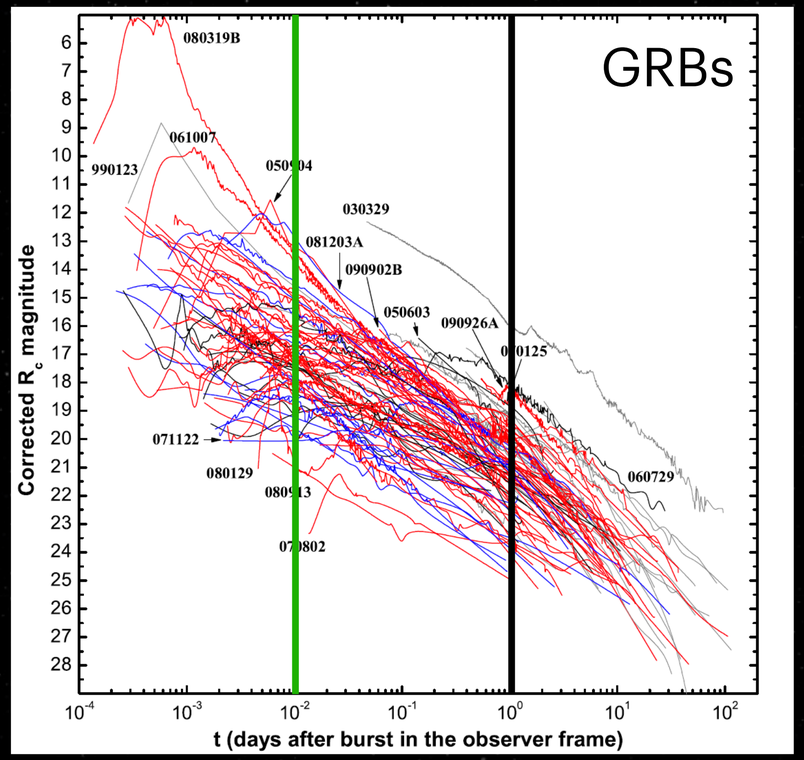
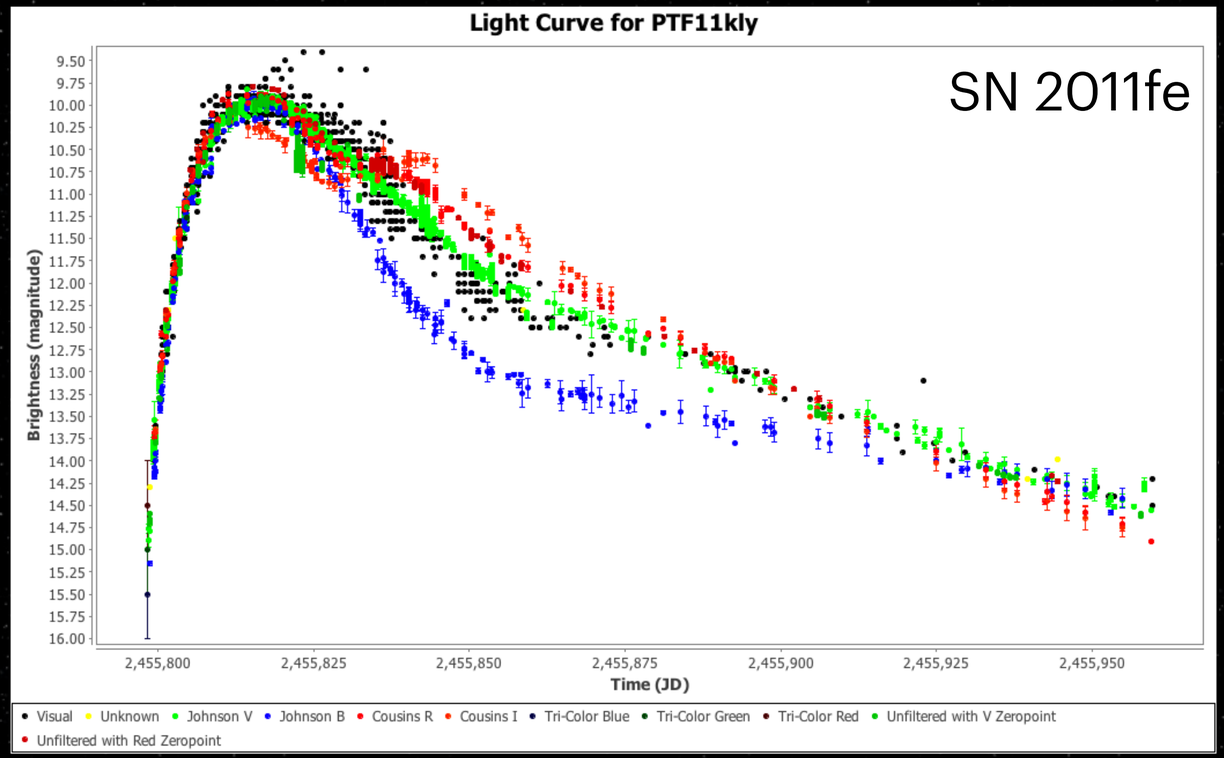




For these events:

Important to catch the first minutes, hours, days

For these events:

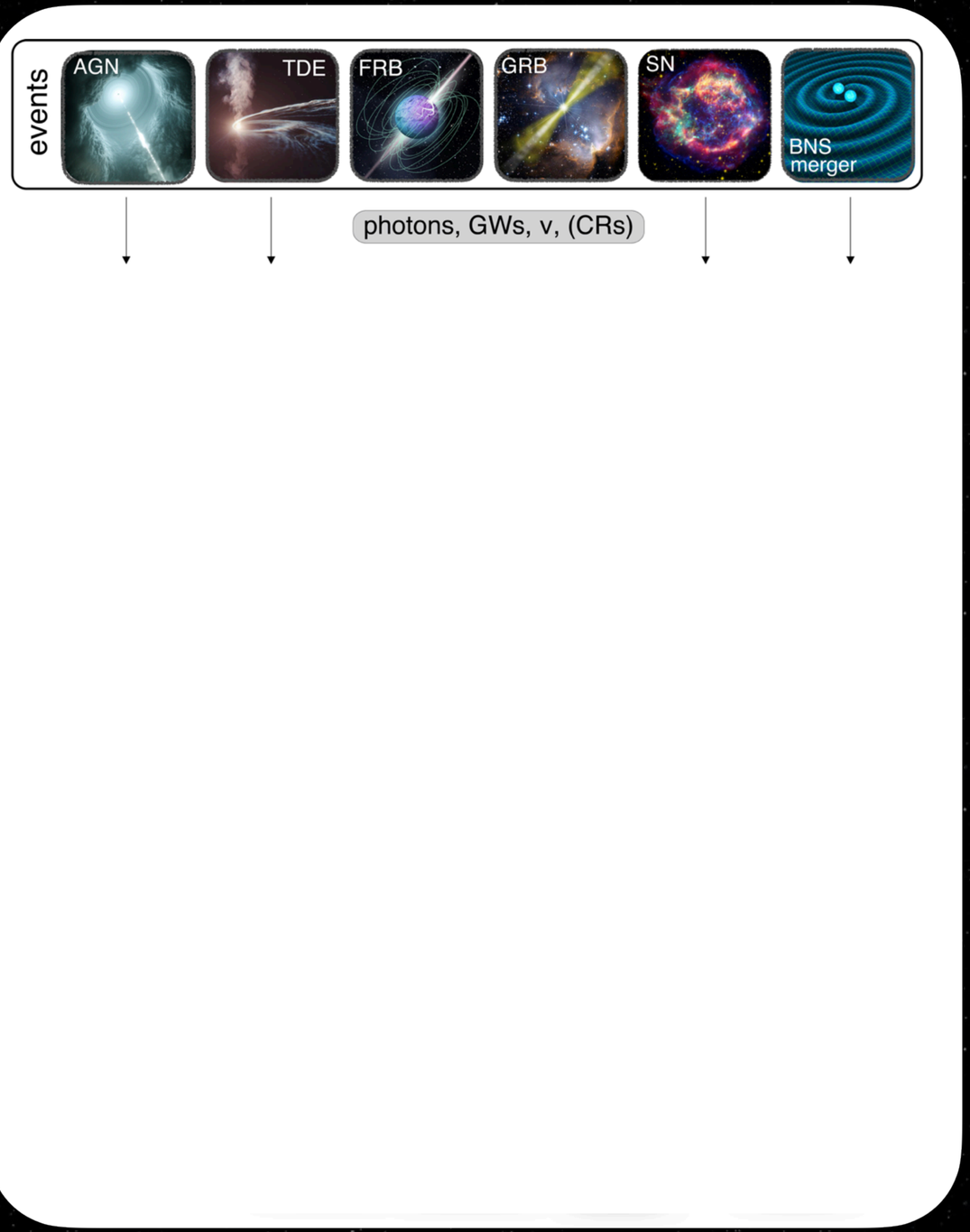
Important to get a continuous survey

We need to know where to point and react fast

The app for real-time follow-up of transient sources

How is this done?

1. The event occurs in a “random” place at a “random” time, emitting all or some cosmic messengers



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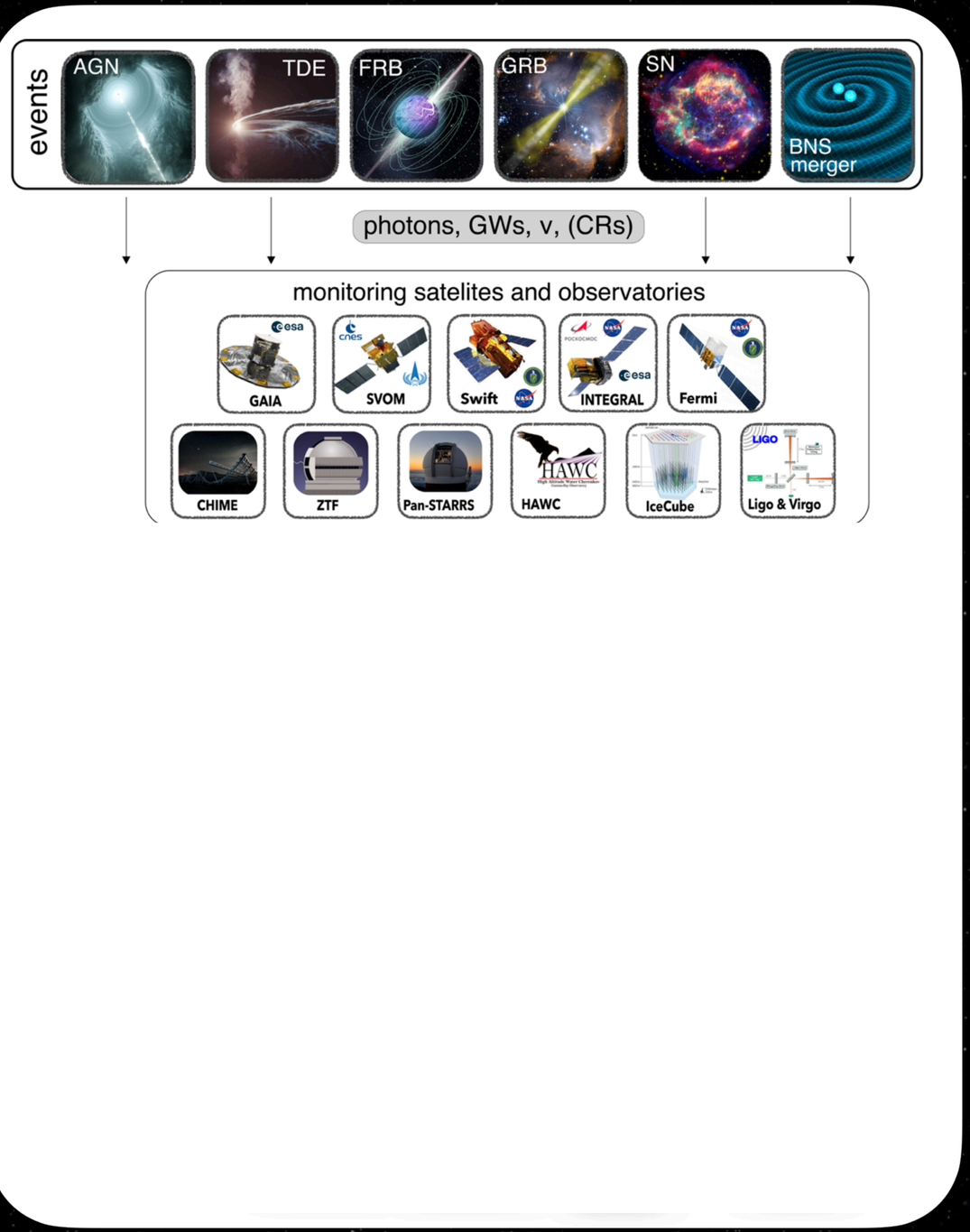

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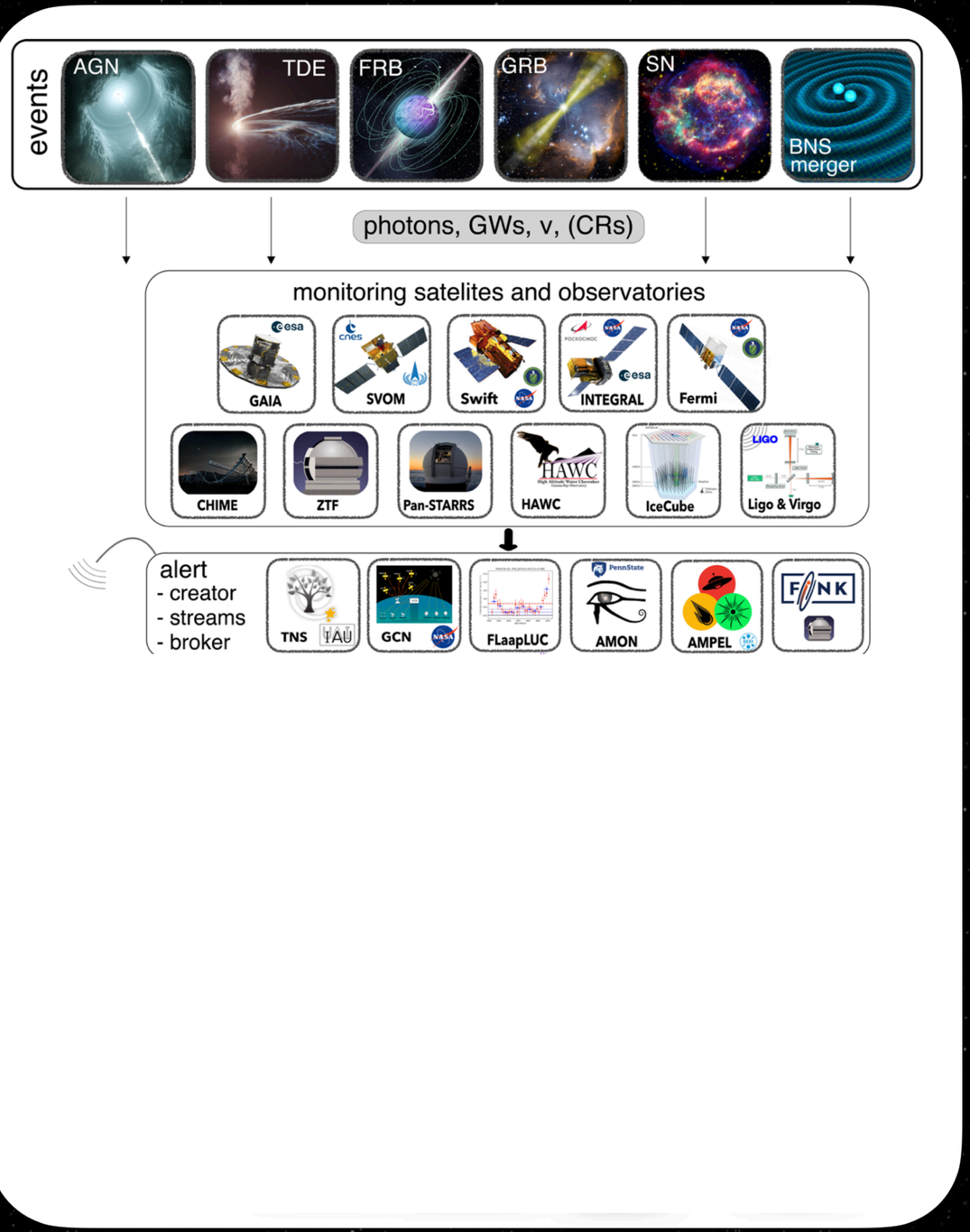

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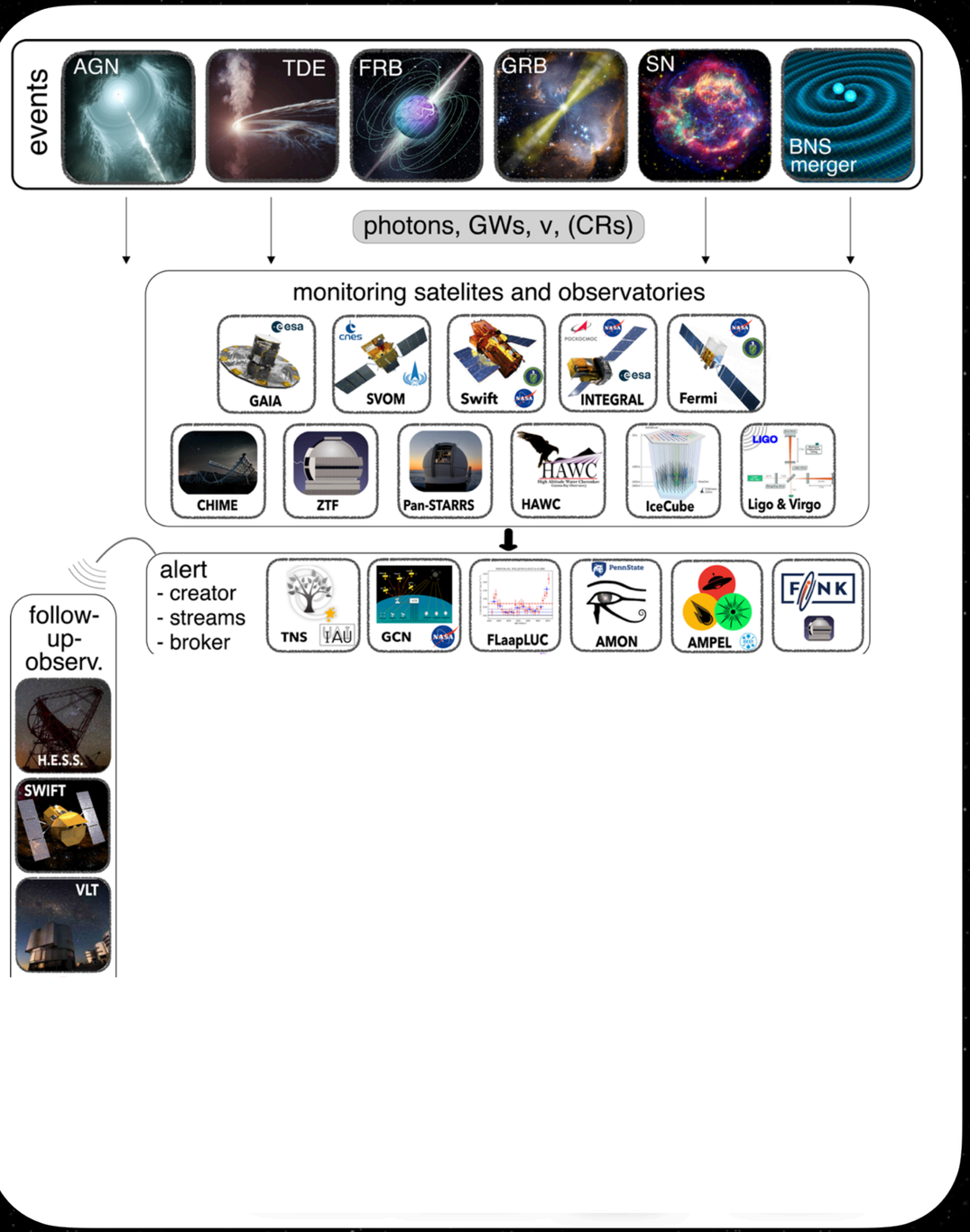
4. The alert is received by professional facilities to perform follow-ups on the position of the received alert



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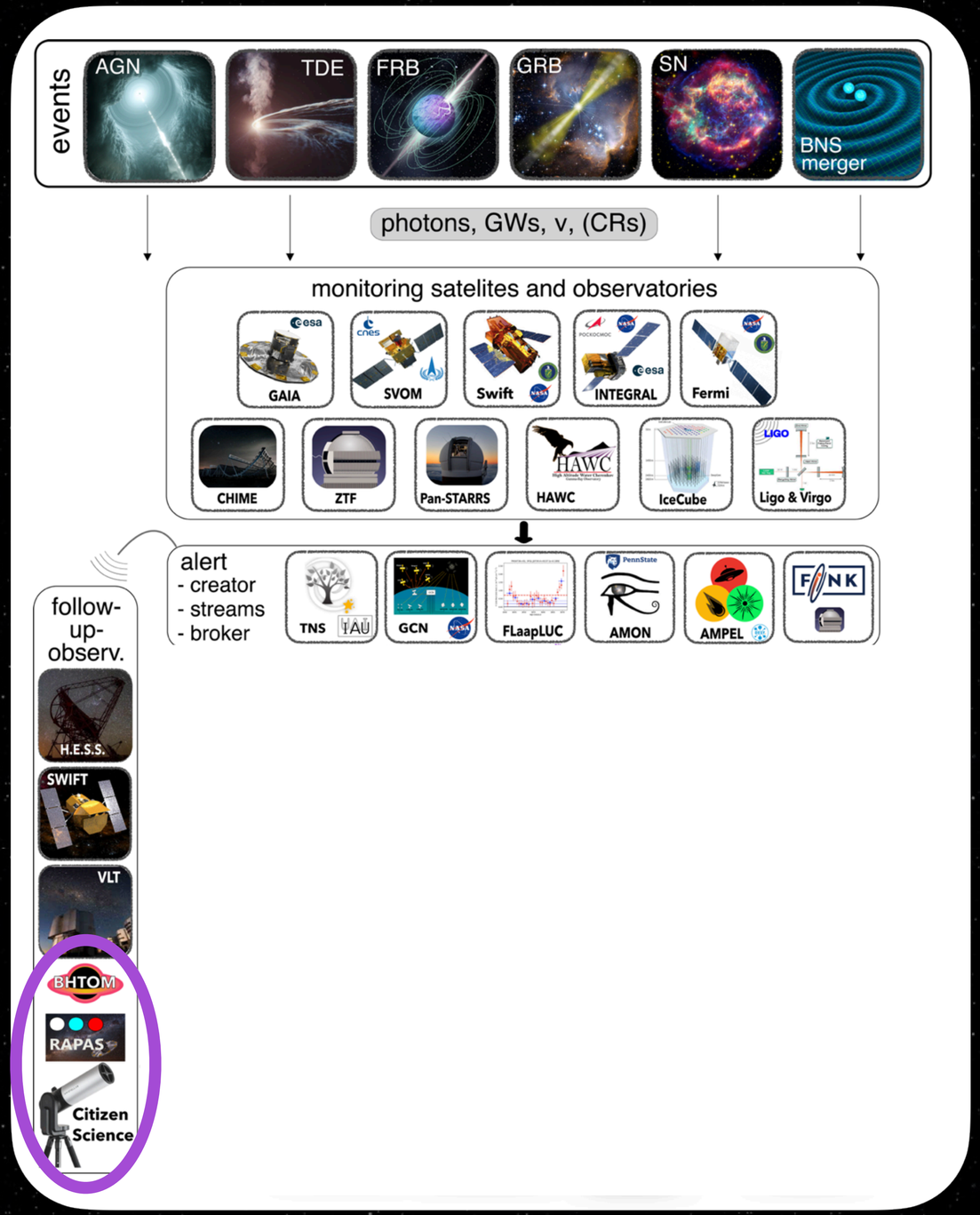
And the general public?



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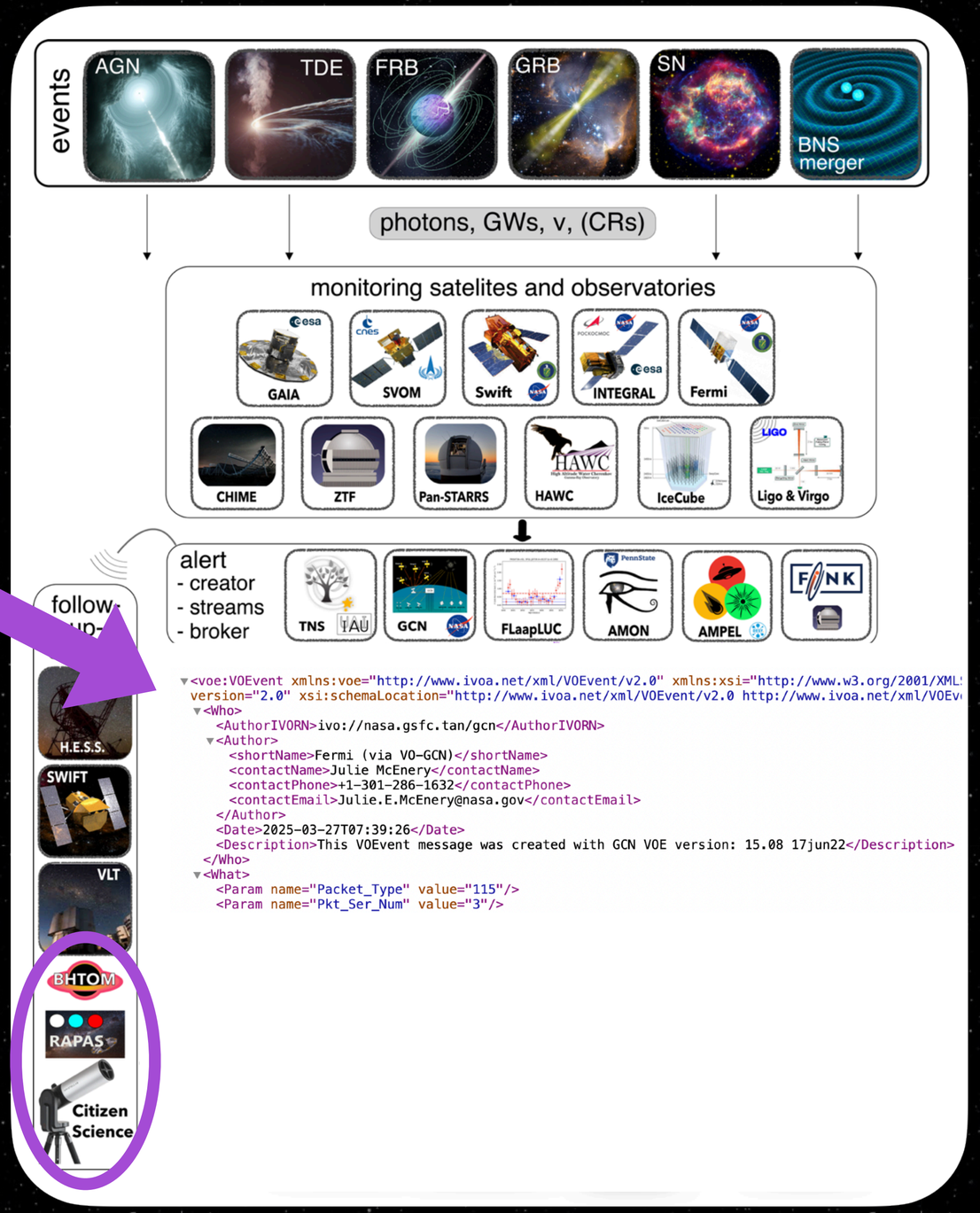
Alerts are difficult to read for humans and not even accessible



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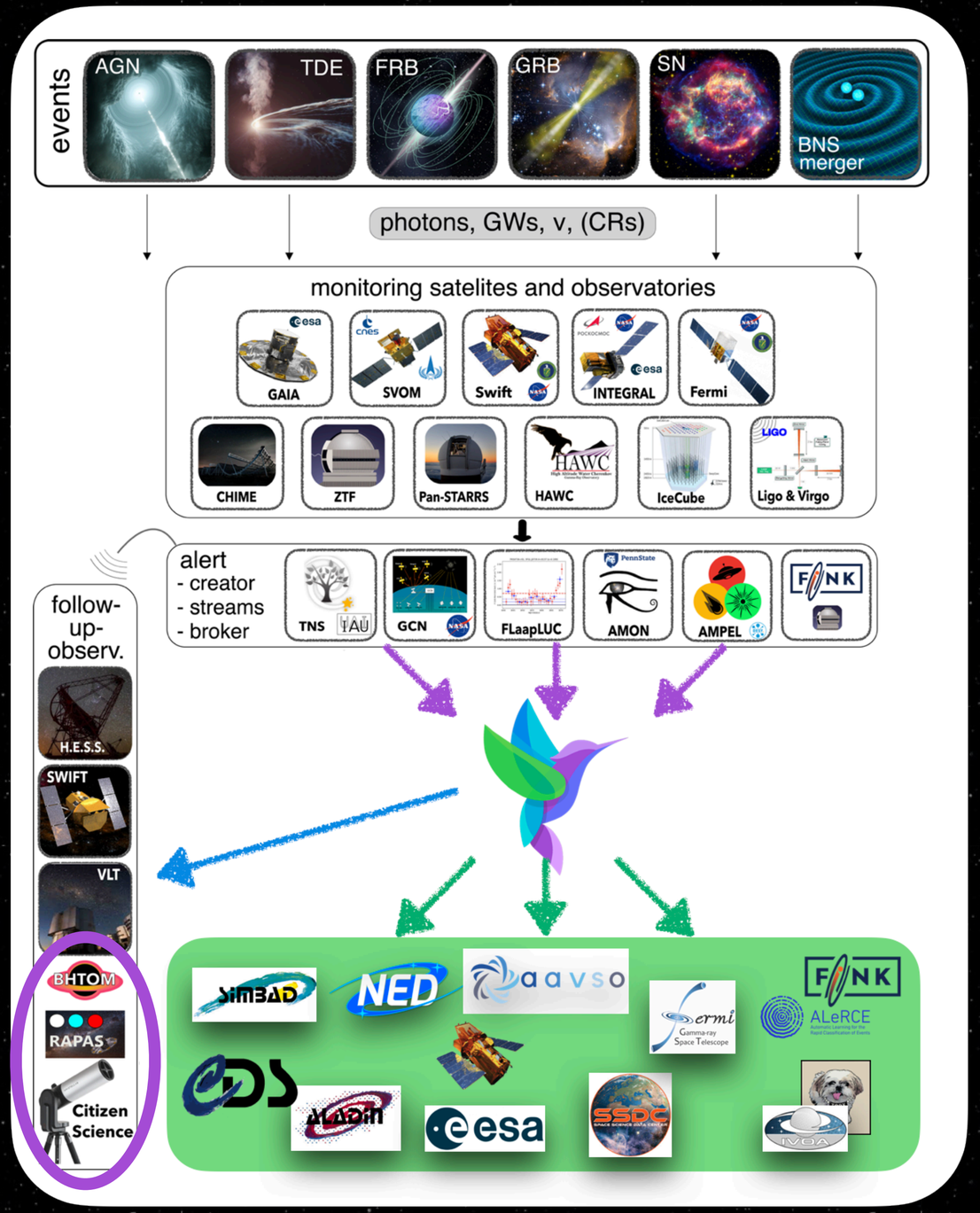
Information scattered in many useful (but no so user-friendly) pages

How is this done?

Solution

- All of the information from an alert in **one place**
- **User-friendly** interface
- **External links** to all the useful astrophysical pages
- Fully **customaziable** to see just what you are interested in
- **Pop-up notifications** to never miss an alert



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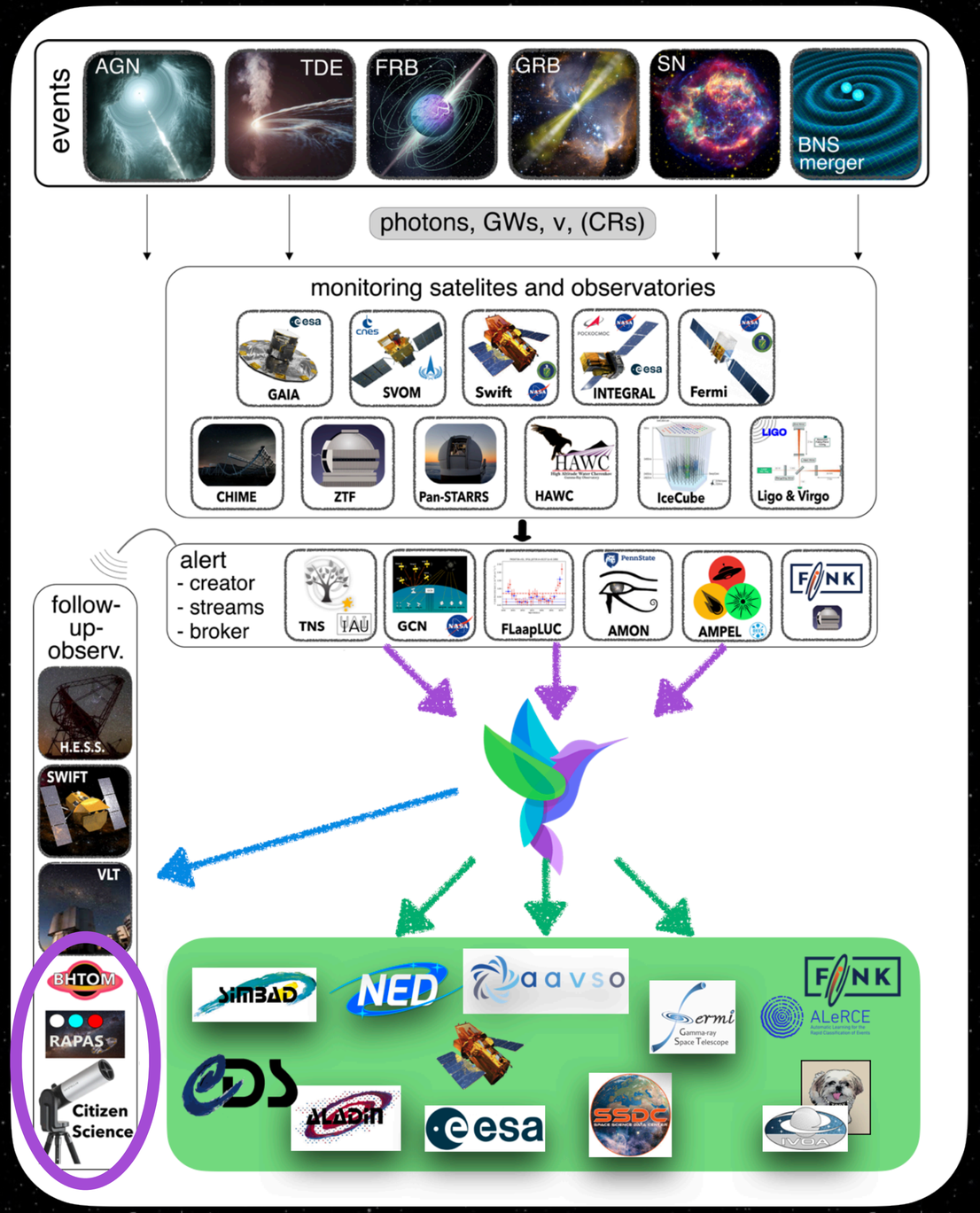

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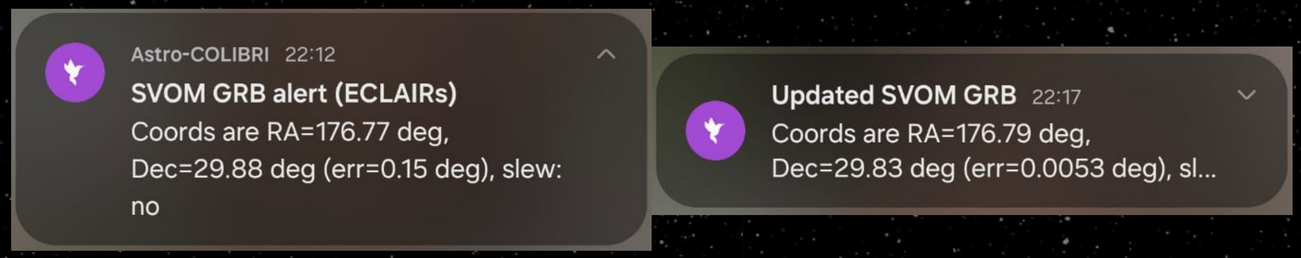

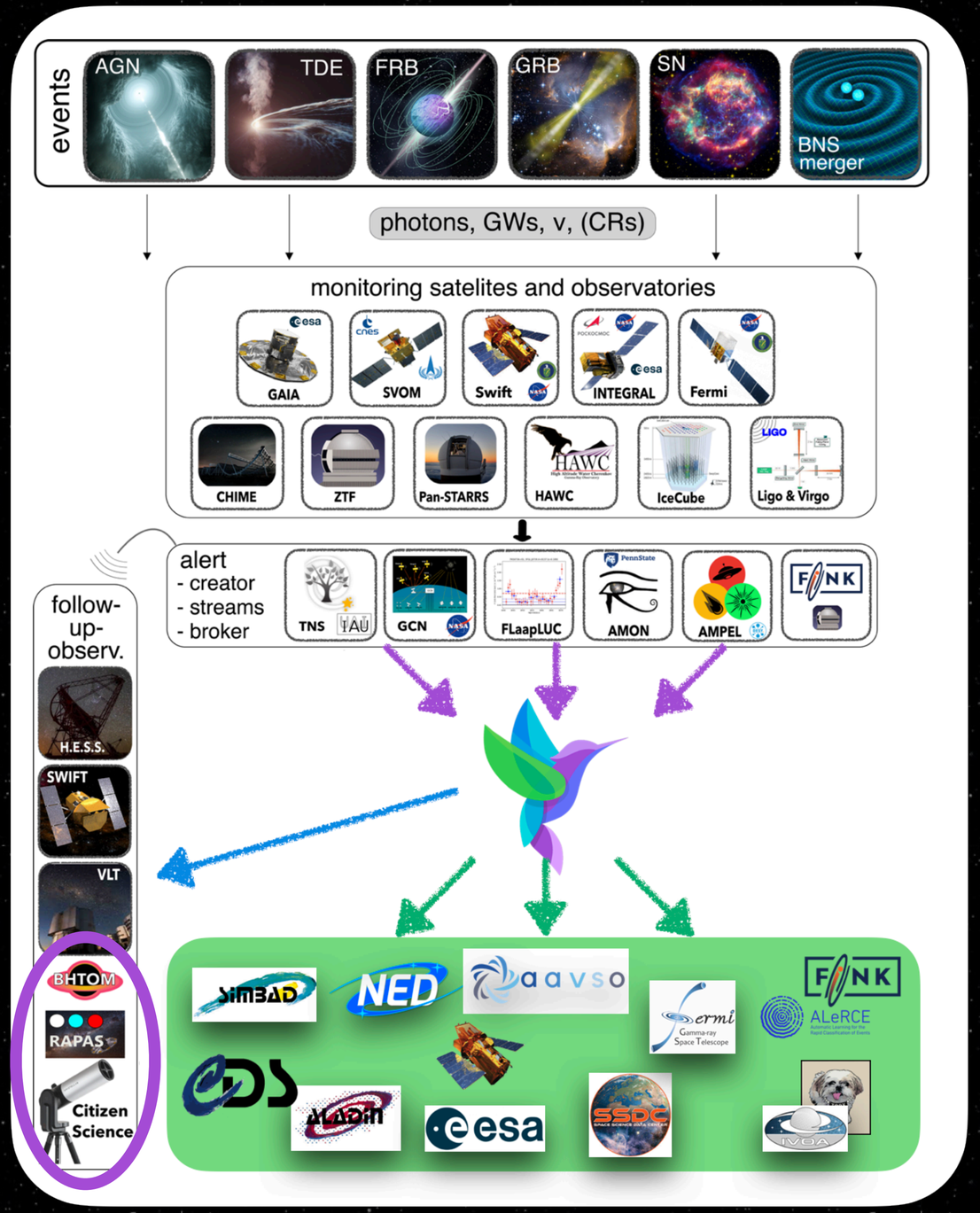

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