Topic 7 - Better alert visualizations in astro-colibri.com

Improved display of historic alerts that belong together

- We overwrite alerts with the newest alerts and merge information
- Visualize a possible implementation in the front-end (drawing, graphics)

Participants:

1. Erik
2. Jurek
3. Iryna
4. Massimiliano
5. Ilaria

location: HIB entrance

Hard to see historical alerts in context with another event

- Current view has a bug:
  - When in a cone search, expanding alert search window does NOT show historical events, must return to all sky view, expand time window THEN do cone search
  - Computationally intensive
    - Mainly if the user wants to display most event types in time range of years
    - The interface is slown down
    - Better to do the search directly in the error region

Including information on past alerts in same region - 1
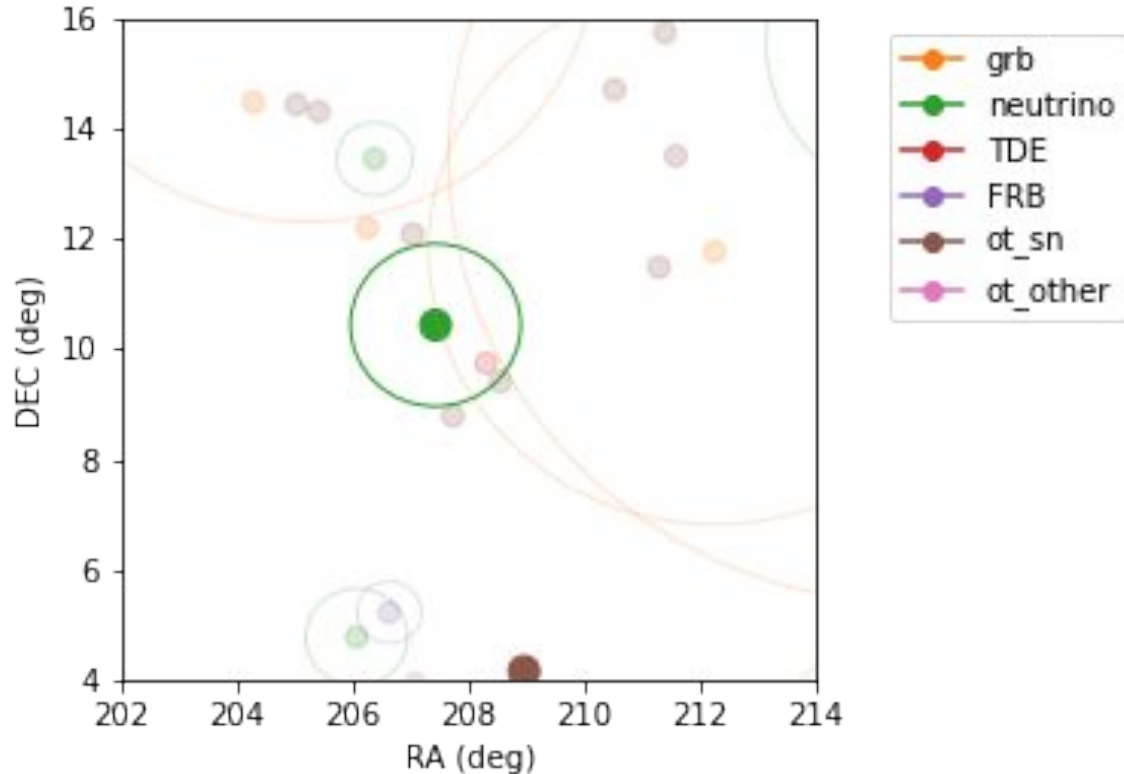
- Need a better way to know if there are historical events in that search cone
  - Useful to select time window also when in a cone search
    - Maybe it can be an additional option of the custom cone search
  - Could have a list of all historical events inside the cone search and those outside it but with overlapping error region in the selected time window
  - For each past event a link to the related publications can also be added, besides the information already provided

- Uncertainty regions of associated alerts are not currently displayed
  - When click on a event it would be useful to see its error region together with the one of the interested event in order to see the overlapping
  - Add also GW error regions if overlapping with the interested event

Including information on past alerts in same region - 2

Chosen time window: 150 days

Solid colored points are events within time window

Faint points are events happened in previous times but still in the error region

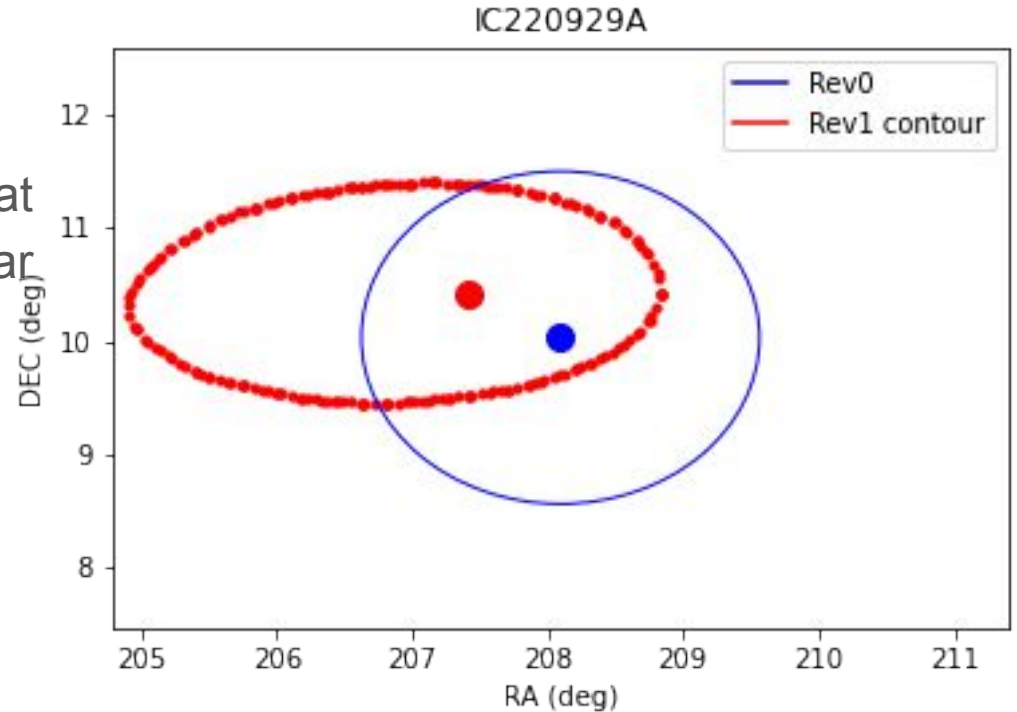# Including information on gamma-ray variability

- When one does the cone search, transient events in the selected time window and 4FGL sources can be seen. While the discovery date for the transients is known, there is no temporal information about the flaring activity of the 4FGL sources.
  - Can try to include date and duration(?) of the last flare for 4FGL sources
- Can be used:
  - [FAVA weekly flare maps](#) (all-sky, aperture photometry) are currently not updated but maybe the maintainer (Daniel Kocevski) will fix them if there is interest.
  - [Fermi-LAT light curve repository](#) (catalogued sources, but the LC is shown only for brightest ones)
  - Other suggested regular analyses of "regular suspects" AGN searching for flaring

Alerts with multiple revisions

- IceCube neutrinos have typically two revisions of the GCN notice.
  - Astro-COLIBRI updates the alert "silently" (can be misleading)
    - Add revision number to alert data?
    - And allow users to see old alerts? Maybe good enough to link to original source
  - Provenance of information not always obvious
    - How do I know that IceCube comes through GCN? Maybe the source from where the information about the alert/source was taken can be added

Alerts with multiple revisions

- IceCube has more information following from the rev1 GCN that we can include in Notice/Circular
- Full 90% (and 50%) error contour
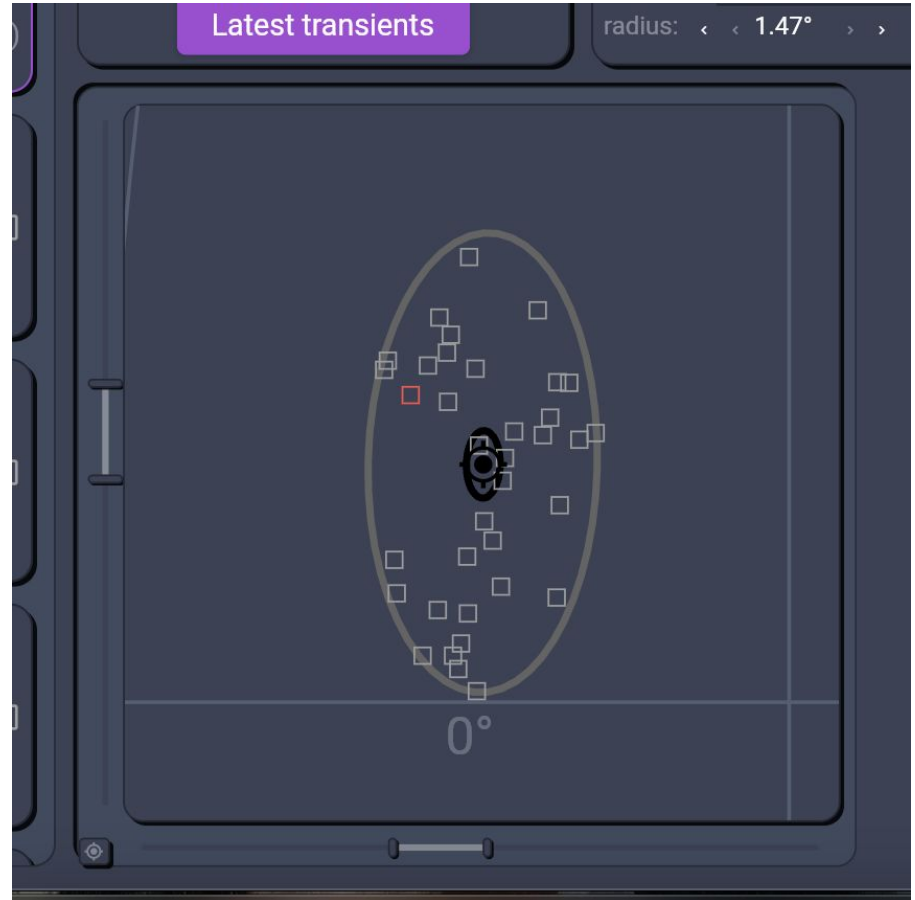- Have plans to make this public

Other suggestions

Need scales on skymap

We've been confused by "cone circle" and error circles a few times…maybe different color (add legend?)

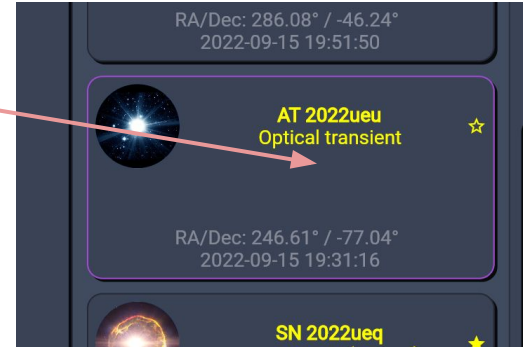Also zoom seems to do random things sometimes

Add option to move skymap by dragging with mouse instead of moving sidebars

Use [github oath](#) for accounts

Useful to have

- For each event also the yearly visibility can be added
- 'optical transient' event class -
  - info about the source class can be added
    (e.g. AGN, TDE, Nova etc)
- Add cone search for GW events
- Scroll bar for the event list often does not work

Query tips

```
mseconds_since_epoch = datetime.datetime.now().timestamp()*1000
print(mseconds_since_epoch)
response = requests.get('https://astro-colibri.herokuapp.com/cone_search?cone=[208,10,5]&datemin=0&datemax=%d' % \
mseconds_since_epoch)
```
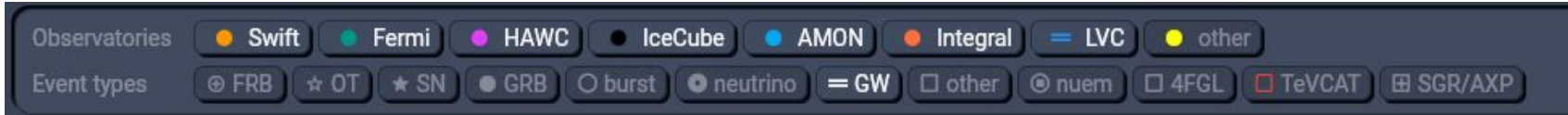
Better API documentation - cone search:

- datemin and datemax: unit is missing (it is milliseconds)
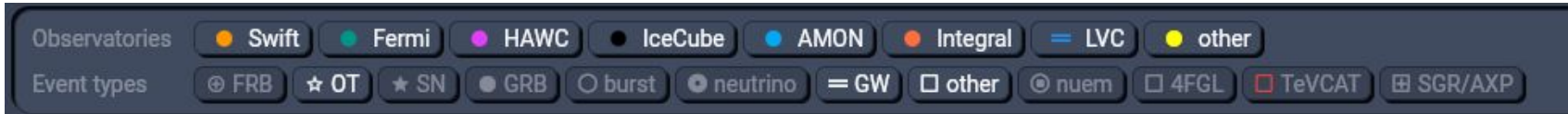- The response fields are just the event-fields, there is a source list too

Code used to make plots:

https://github.com/blaufuss/astro-colibri-examples

Observatories-Filter controls some event-type filter

Turn on "other" in obs. ->

"OT" and "other" (some times "SN" too) are switched on

- Also, are there any events in the event type="other"?
  If yes, what is the difference between "other" and "burst"?
- Add option to select/deselect all event types/observatories
- Differentiate the "other" observatories between
  at least optical and radio
  - FRBs and OTs have same color in the map and this can be misleading