Search for γ-ray emission in the NLS1 galaxy IRAS 20181-2244

Michele Frezzato

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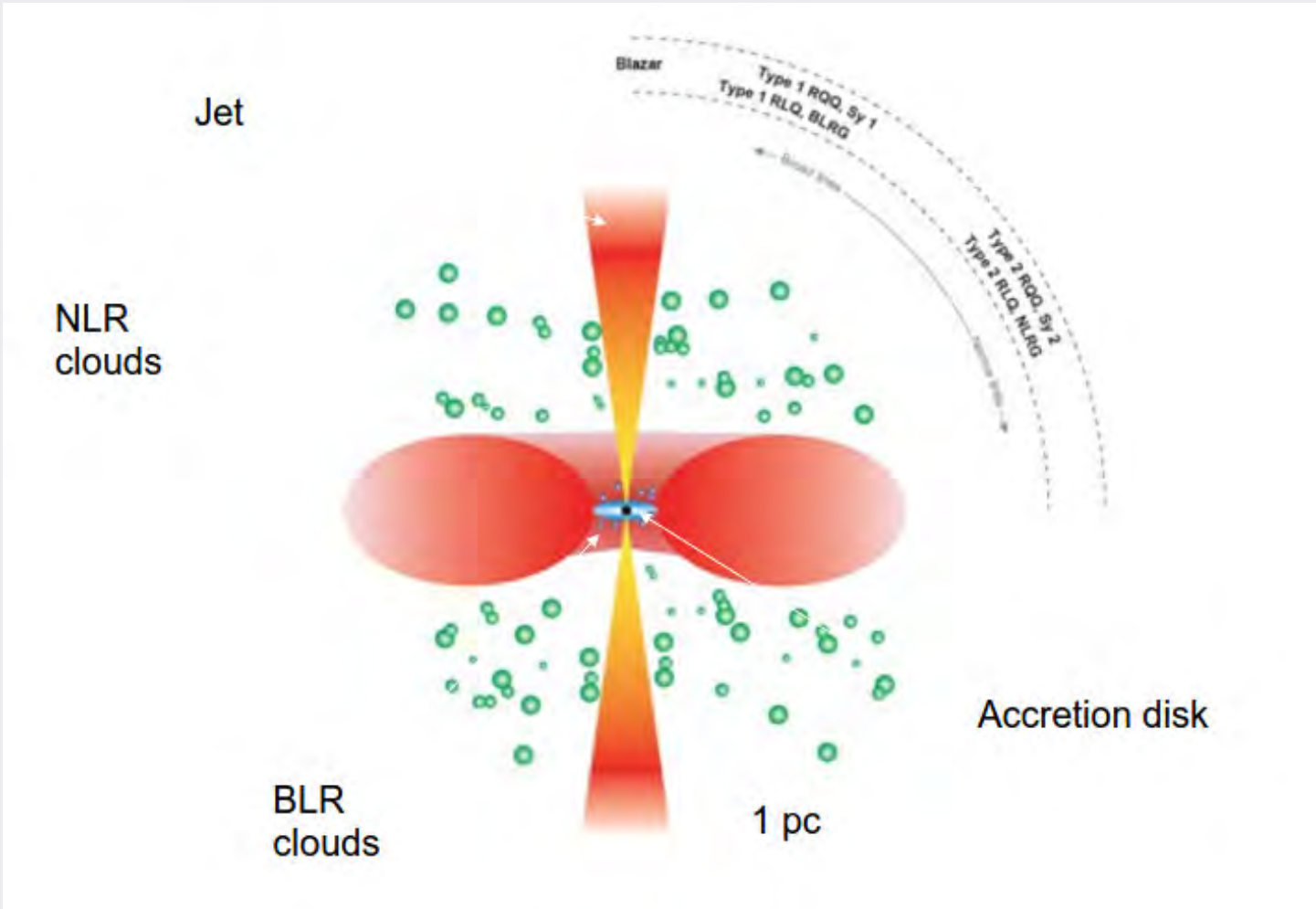
Supervisor: Stefano Ciroi, Francesco Di Mille



Narrow Line Seyfert 1 are classified according to their unusual spectral properties [Osterbrock+87]:

- Active Galactic Nuclei
- Type 1 AGN: $H\beta/[O\ III] < 3$ and presence of strong Fe II multiplets
- However the FWHM of $H\beta$ is lower than $2000\ \mathrm{km\,s^{-1}}$

Have been subdivided into

- Radio Loud NLS1
- Radio Quiet NLS1

On the basis of the Radio Loudness parameter [Kellerman+ 89]:

$$R = \frac{F_{5Ghz}}{F_B}$$

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FERMI-LAT led to the discovery of γ-ray emission coming from a flat-spectrum radio-loud narrow-line Seyfert 1 [Abdo+09a,Abdo+09c]

Another clue of the presence of relativistic jets in NLS1.

There may be a correlation between the environment and the presence of jets in NLS1.
In particular radio-loudness can be the byproduct of merging events [Chiaberge+15]

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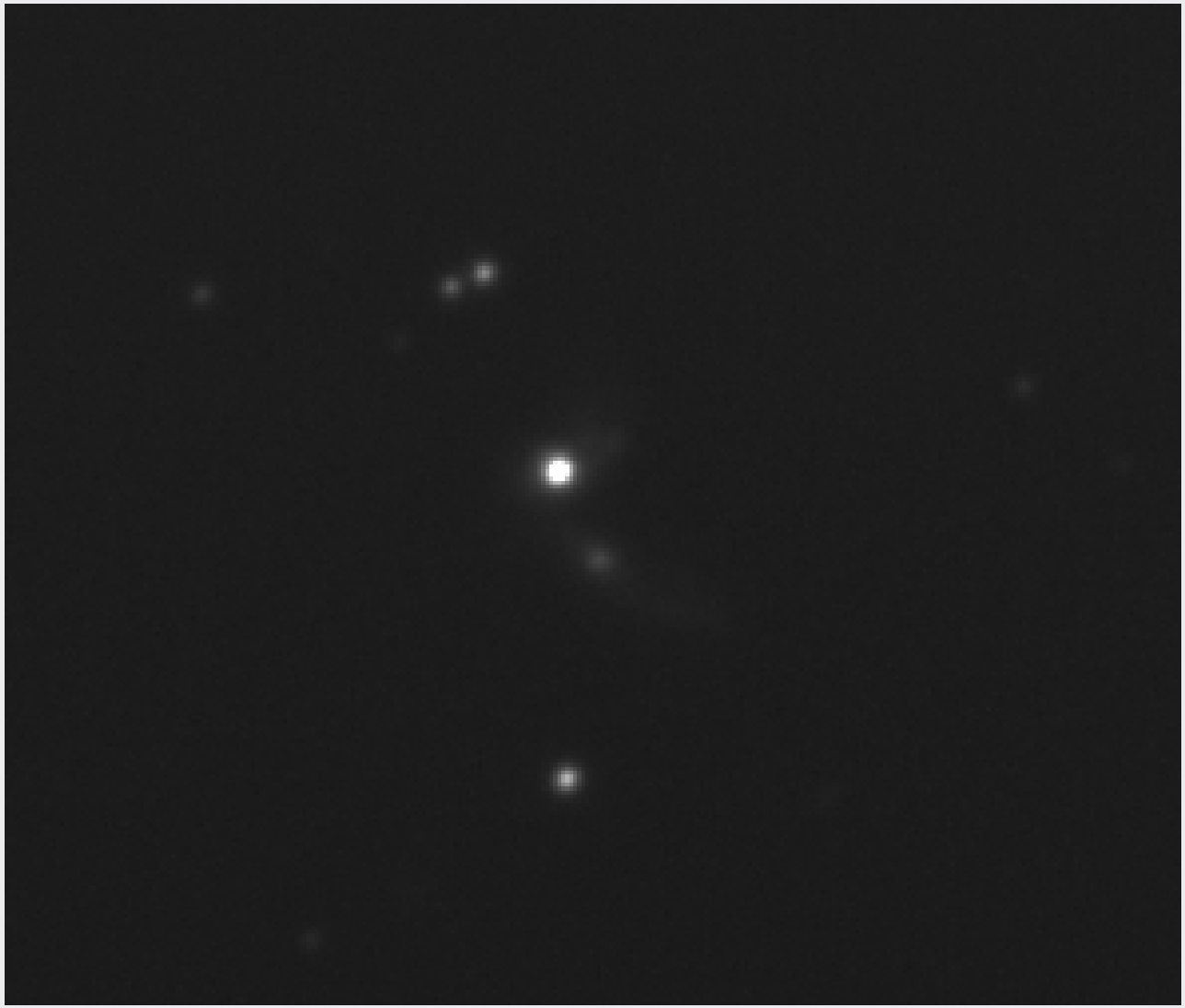
Why IRAS 20181-2244?



- It is a RLNLS1 likely hosted in a spiral galaxy
- Preliminary analysis of IR photometry seem to indicate a merger event
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It's worth a try!

All the available photon data available of the source were retrieved, along with the spacecraft data.

A region of interest of 30° around the source was then selected with the task `gtselect`.

Only PASS 8 SOURCE class events were selected (`evclass = 128`), taking both front and back events (`evtype=3`).

A maximum zentith angle of 90° was set in order to remove earth limb contamination

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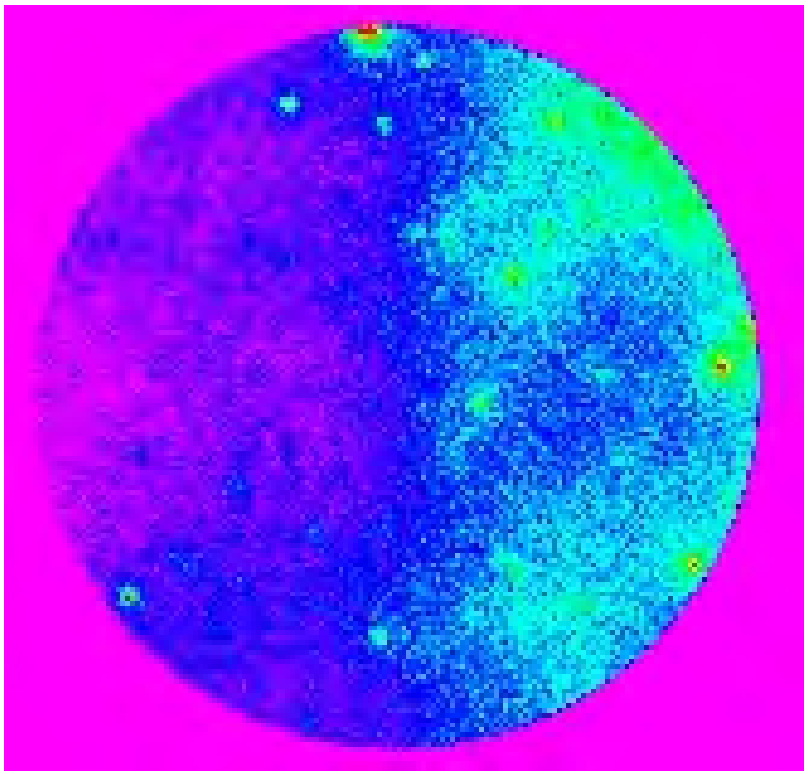
The count map of the ROI was created using `gtbin` with a scale of 0.2 degrees/pixel.



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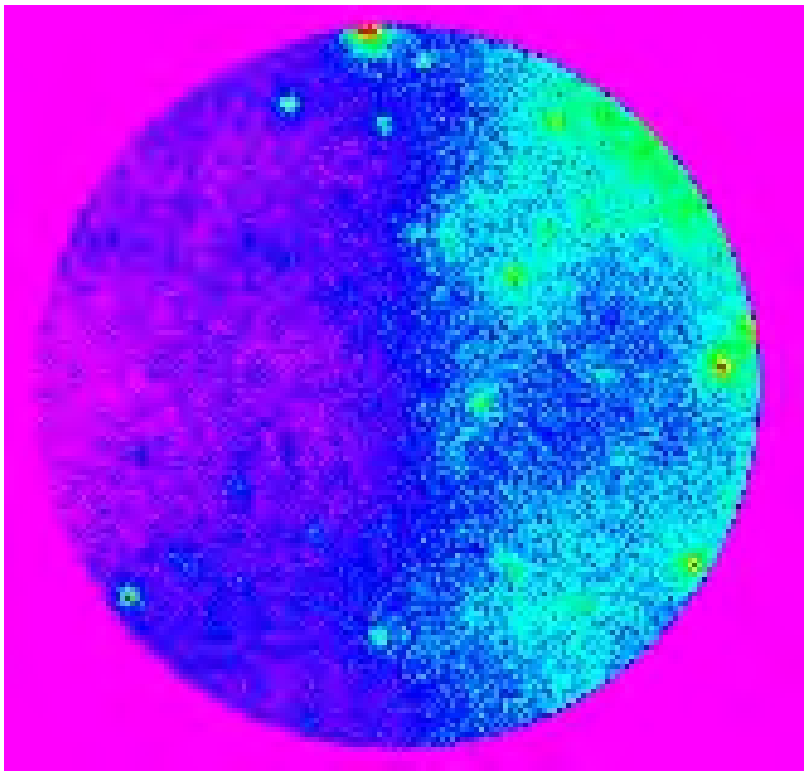

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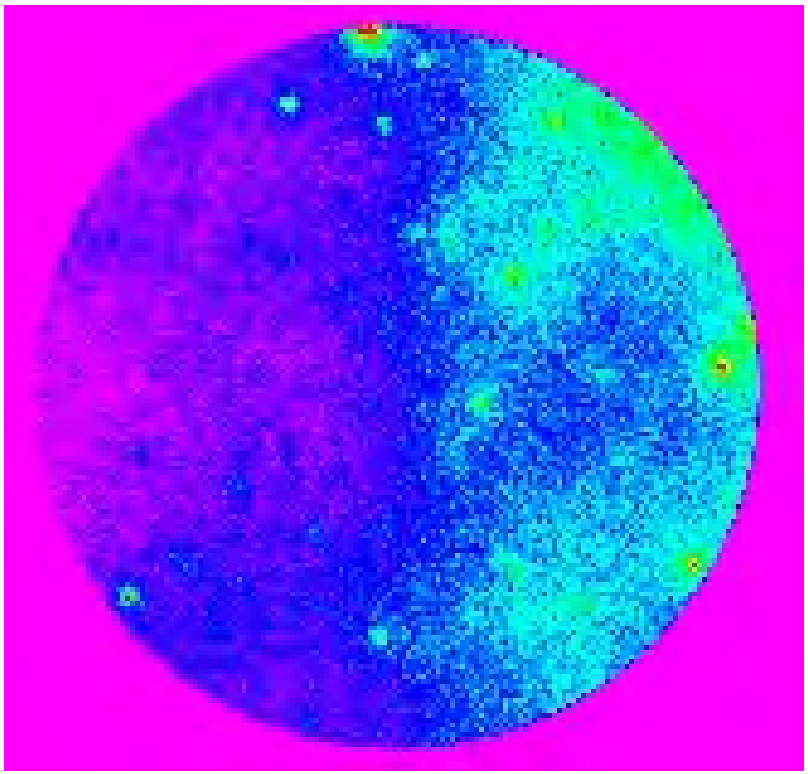

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The source model is a xml file containing the supposed location and spectral shape of the sources in the ROI. It was created using `Make3FGLxml.py`, which add the sources from the 3FGL catalog.

Two different models, A and B, were chosen for the analysis:

- A: IRAS 20181-2244 is modeled as a power law in the center of the ROI with index and normalization left as free parameters
- B: no additional source was added

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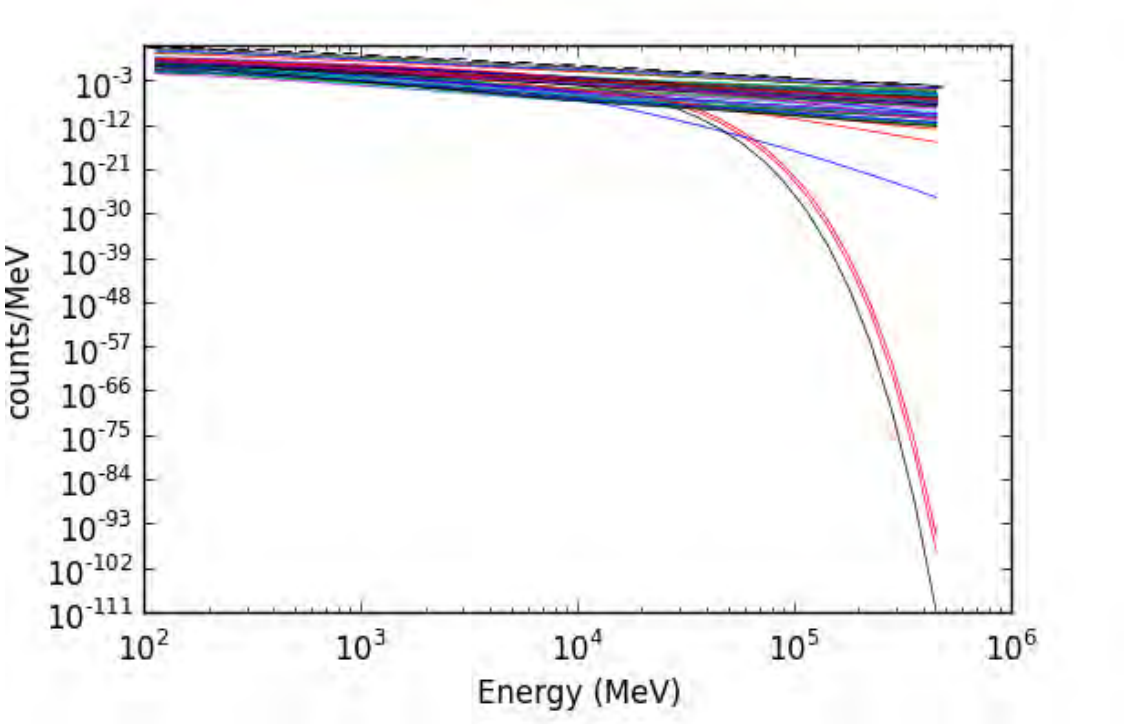
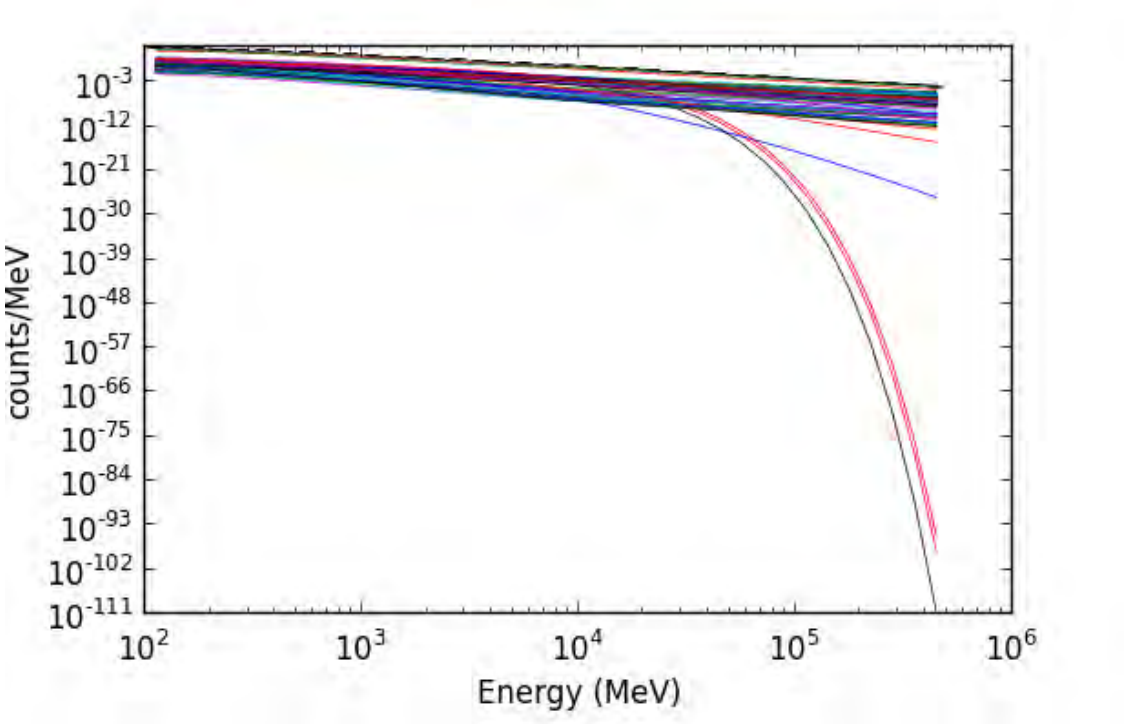
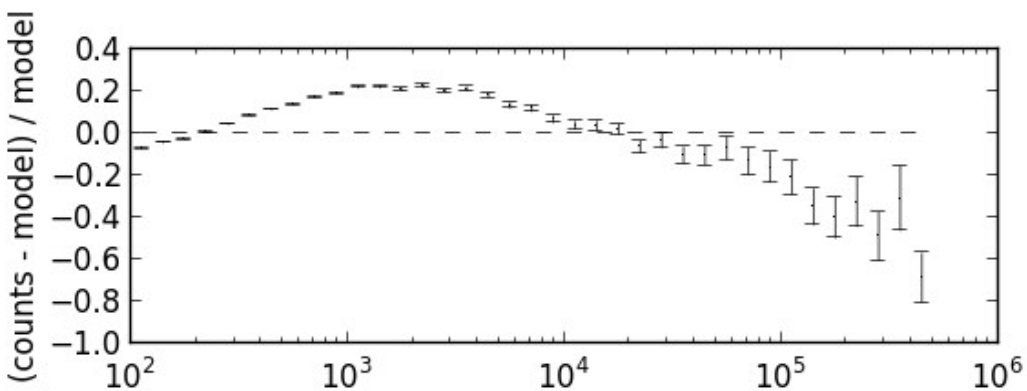
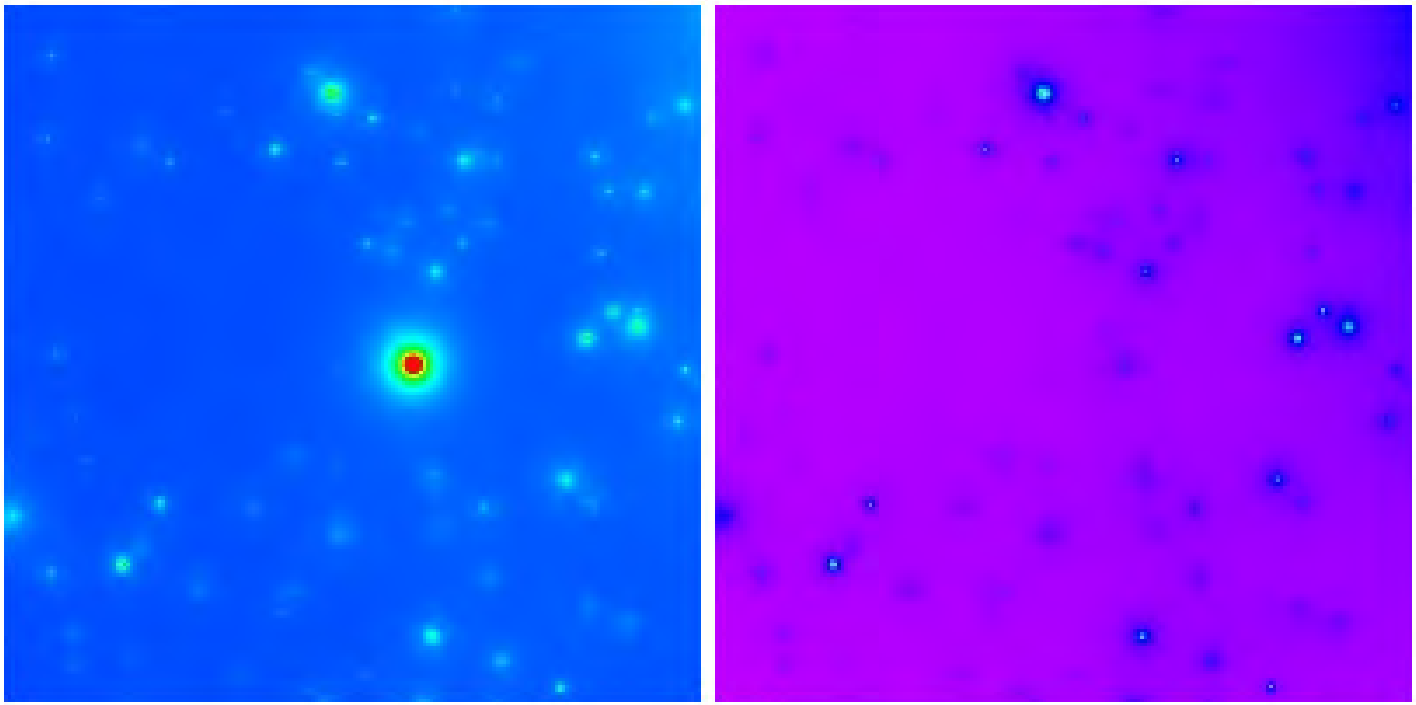


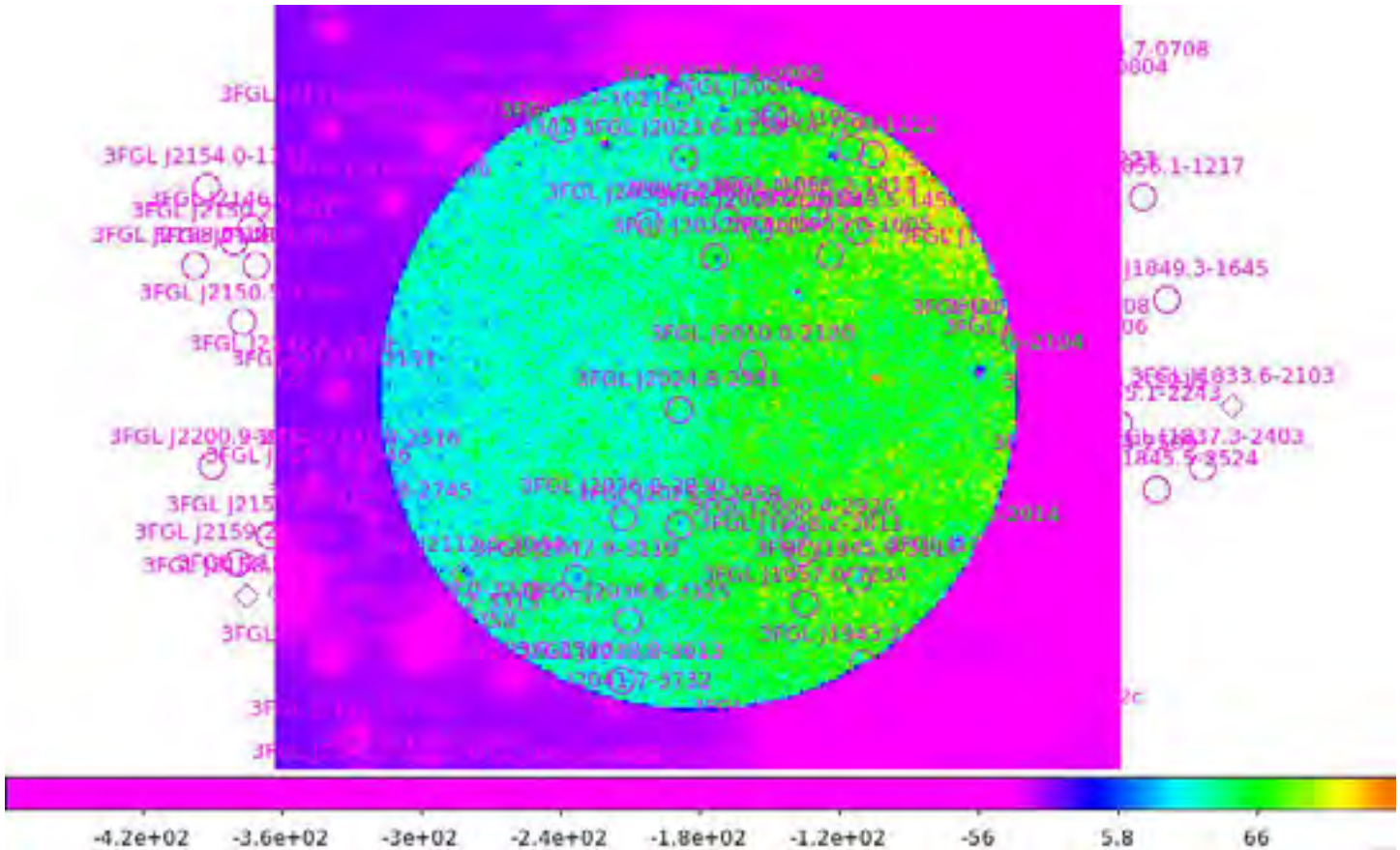
Model B





Model maps





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- Proceed withh the unbinned analysis on monthly time intervals

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