THE FERMI-LAT EXPERIENCE: LESSON LEARNED

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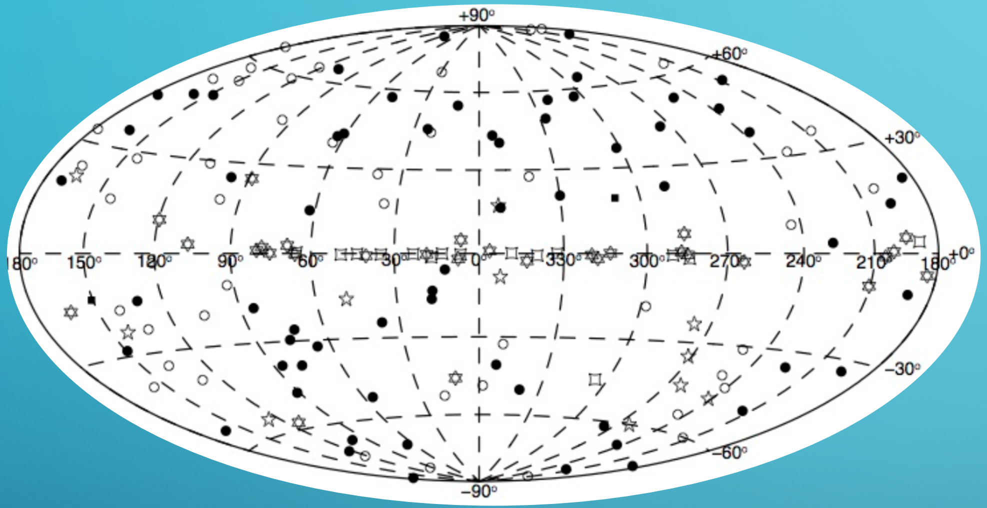
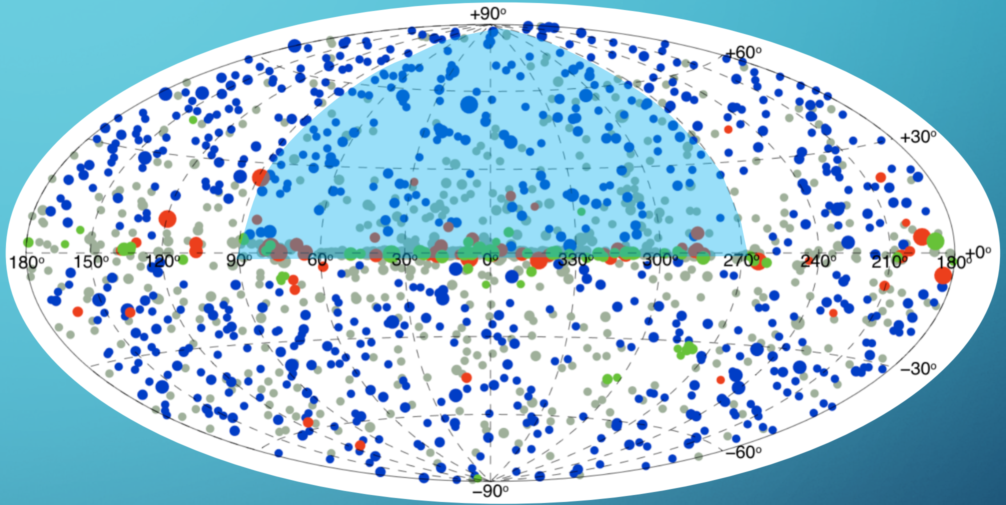
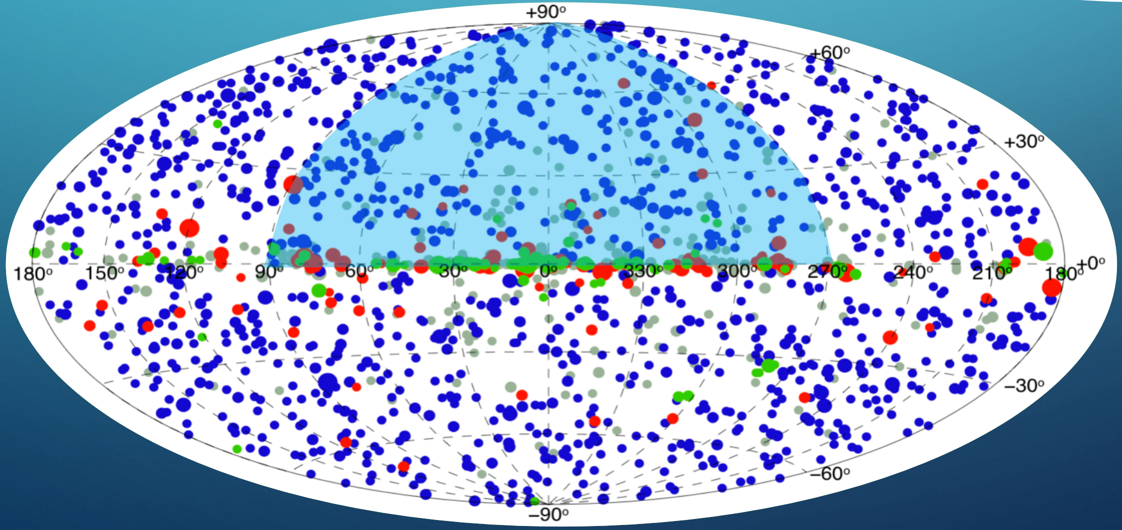
FOREWORD

- No need to remember the difference between Fermi-LAT and CTA
- Focus on the Extragalactic Science
- Overview on the Fermi-LAT catalog
- What we learned, what we found

EARLY FERMI CATALOGS (0FGL /1FGL/2FGL)



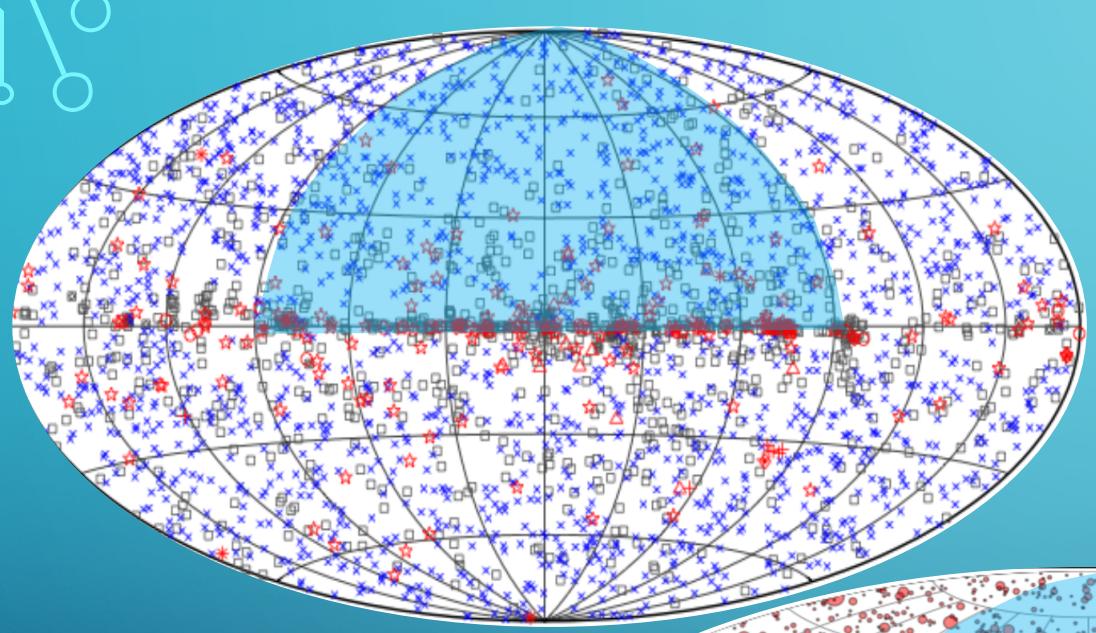


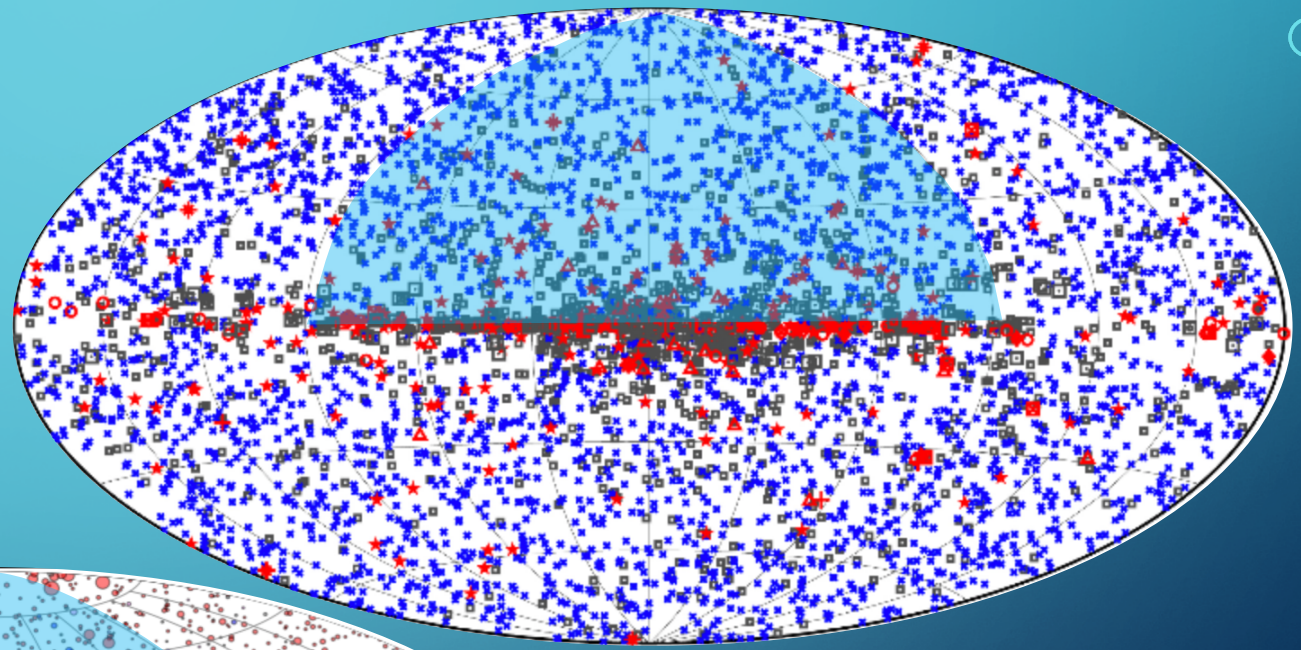


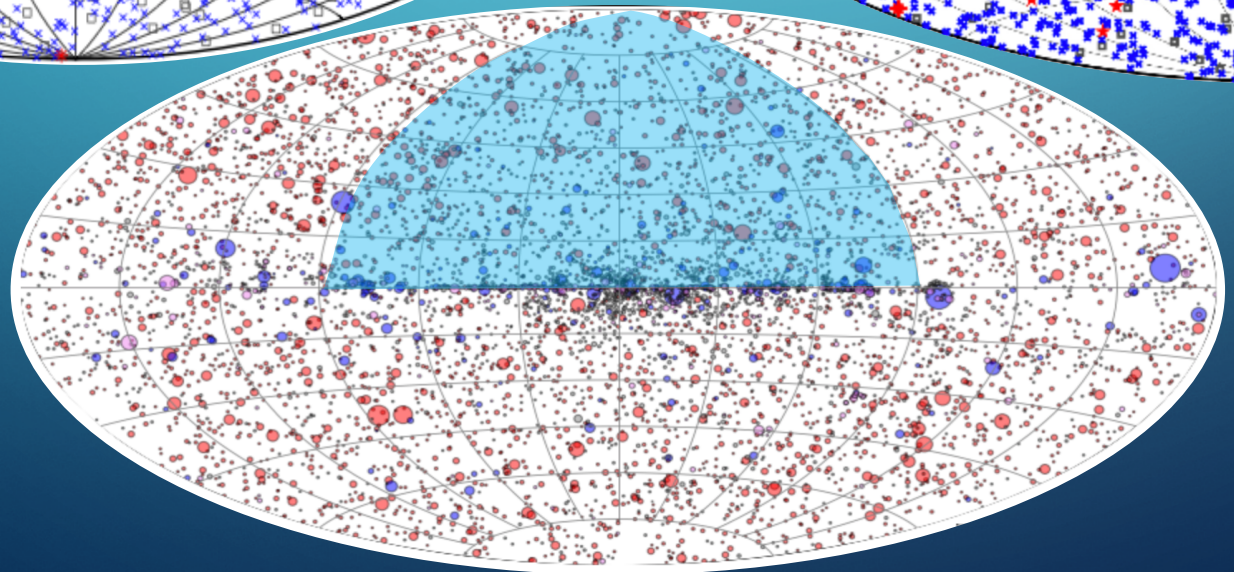
EARLY FERMI CATALOGS (0FGL /1FGL/2FGL)

- We started with a bunch of gamma ray sources from EGRET/CGRO and AGILE observations
- We more or less know which classes of sources are suppose to reach gamma-ray energies
- We relied mostly on the BZCAT for EGAL sky
- Some EGRET detections were missing
- A lot of confusion in association (double/triple counterparts)

RECENT CATALOGS (3FGL/ 4FGL DR1-2-3)



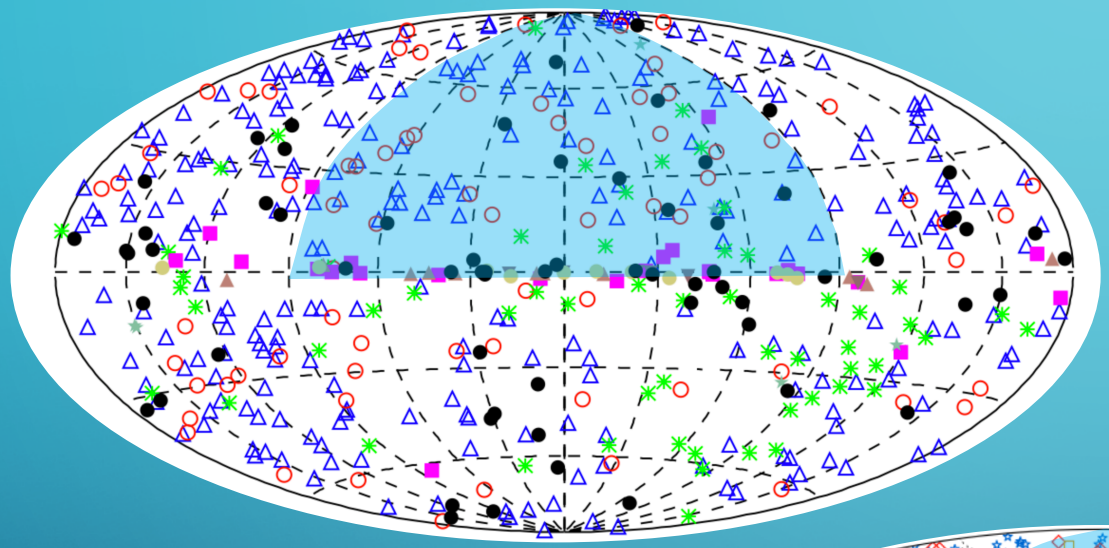


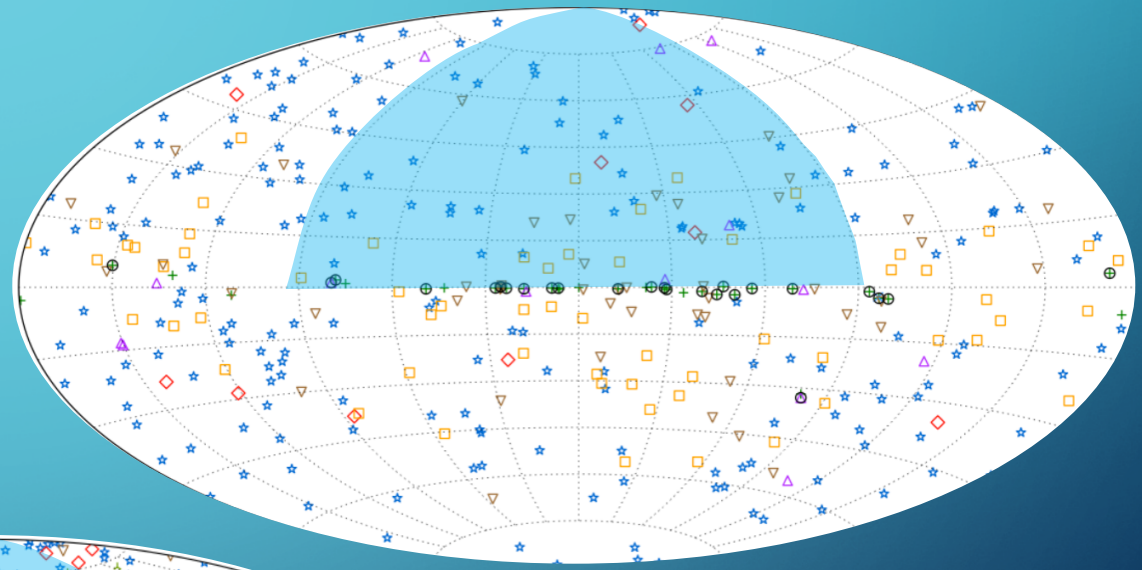


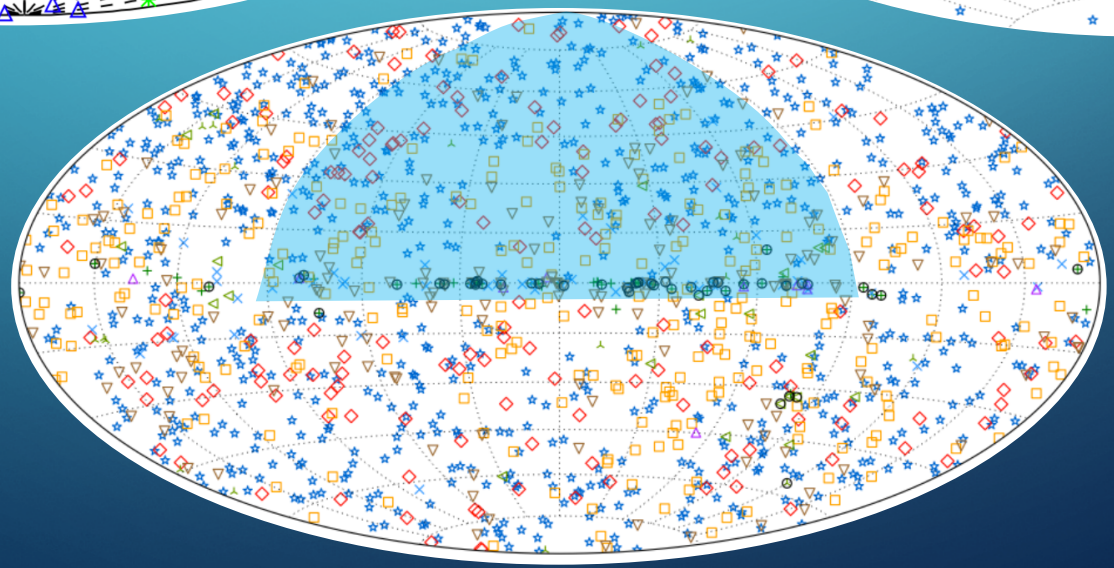
RECENT CATALOGS (3FGL/ 4FGL DR1-2-3)

- BZCAT is not enough, but not yet completed
- Other AGNs (RG, NSLY1, etc…) are increasing in numbers
- Millisecond pulsars outside the galactic plane
- Error regions smaller (less ambiguities in finding counterpart)
- Too many sources, we rely more on our automatic association methods
- Always check the MWL properties of the counterpart candidate
  - Numbers are growing, human operator start to suffer

HIGH ENERGY CATALOGS (1FHL/2FHL/3FHL)







HIGH ENERGY CATALOGS (1FHL/2FHL/3FHL)

- Less background but also less photons
- Change of event reconstruction from pass 7 to pass 8
  - 3FHL triple of the sources of 1FHL
- High Synchrotron Peak BL Lacs dominate the catalogs
- The catalog lists the highest-energy photon (HEP) detected by the LAT
- Millisecond pulsars outside the galactic plane
- 131 new extragalactic sources, half not detected by IACT (at the time of publishing)

WHAT TO BRING BACK HOME

There are more blazars that we thought…

- In 3FHL we expected less than 1000 blazars we had about 1200

…But they are not alone, other AGNs can reach TeV energies

Blind Search of sources open the discovery space

- Better if there are more than one method

Importance of optical follow-up

- Nothing is better than a pair of lines

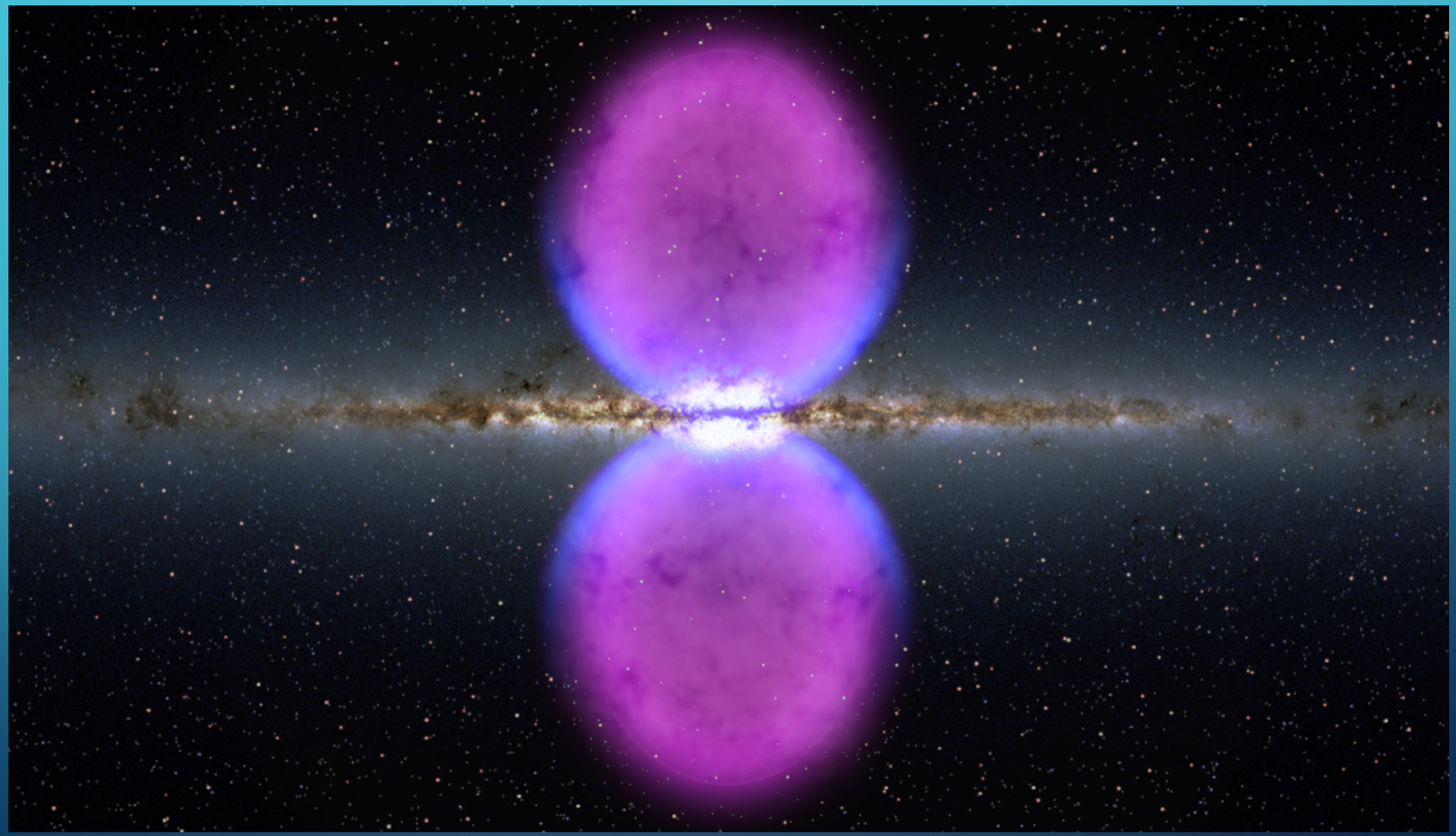
Correlation with rest of the electromagnetic spectrum

Machine Learning association/discrimination methods

Some photons can be beyond the expected attenuation

Be ready for the unexpected…

OUR UNEXPECTED



THANKS!!!