



Search for AGN counterparts of unidentified Fermi-LAT sources with optical polarimetry Demonstration of the technique



ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ
UNIVERSITY OF CRETE



Nikos Mandarakas

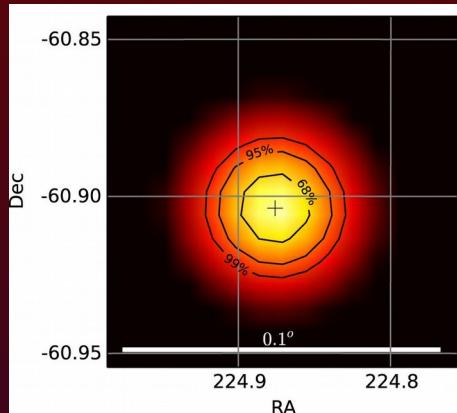
PhD Student, University of Crete

11th OPTICON Gaia
Science Alerts Workshop

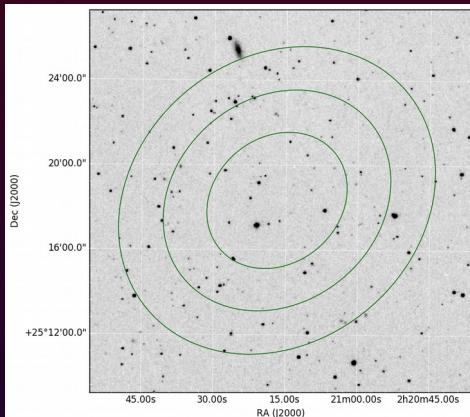


Fermi gamma-ray space telescope

Launch: 2008
 Energy range: 50 MeV-1 TeV
 Latest data release (4FGL DR2): >5700 sources



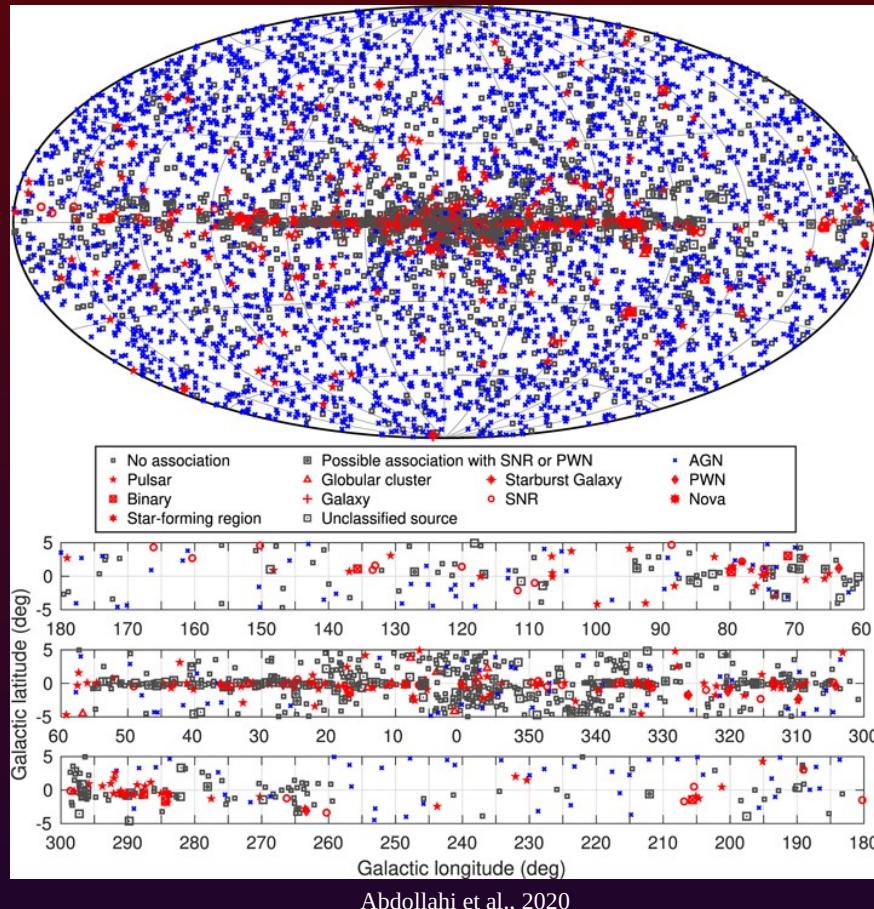
Acero et al., 2015



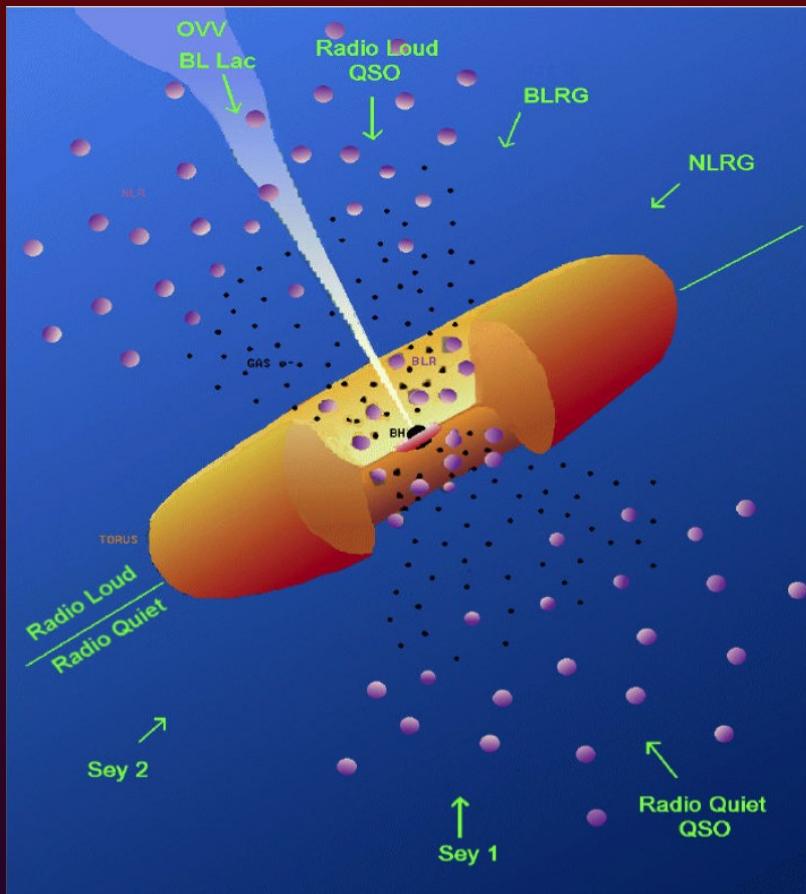
AGN

~86% of identified/associated gamma-ray sources

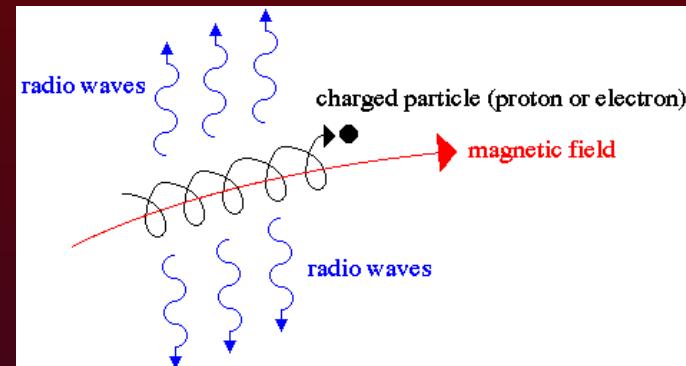
~85% are blazars



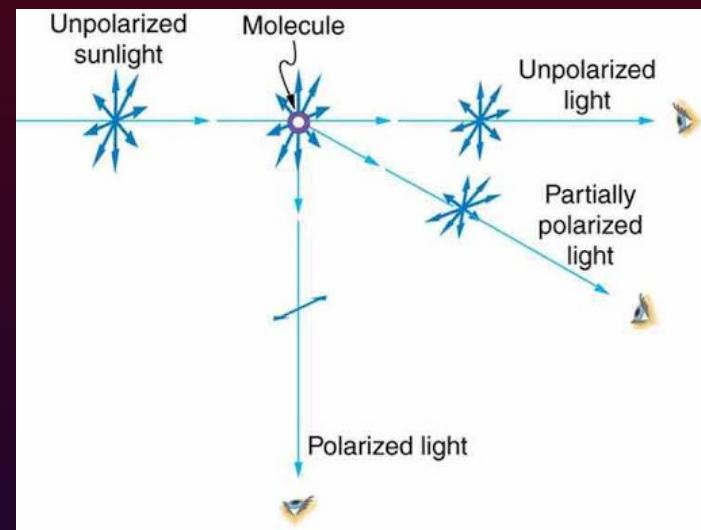
Intrinsic polarization of AGN



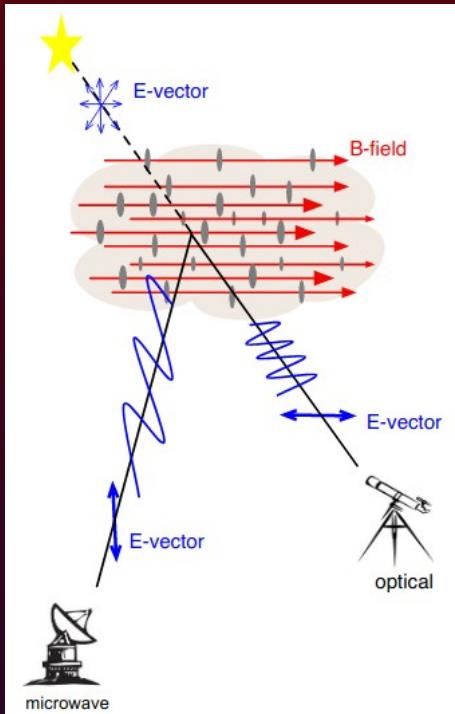
Urry & Padovani, 1995



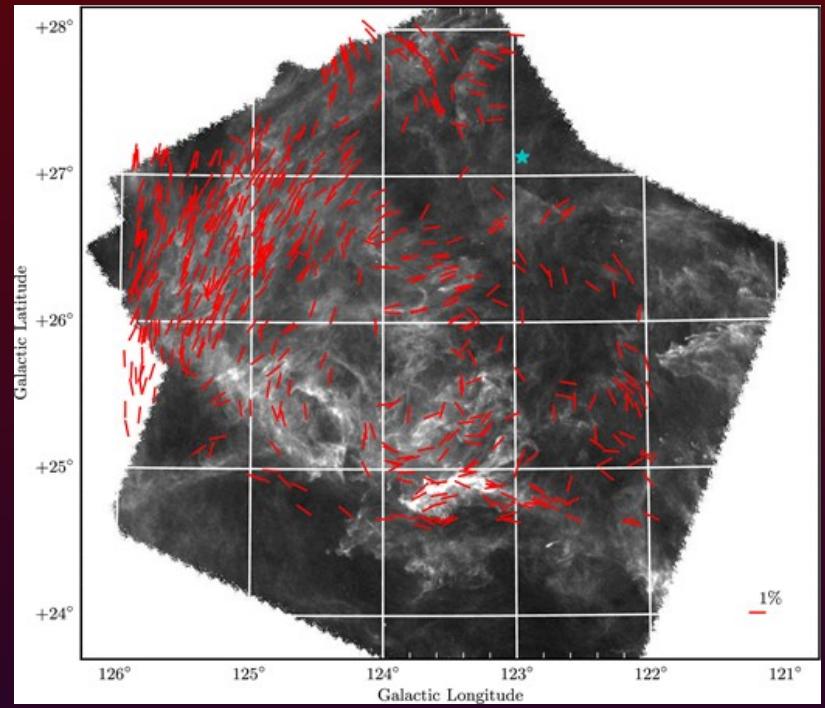
<http://abyss.uoregon.edu>



Interstellar medium: A mighty obstacle



Tassis et al., 2018



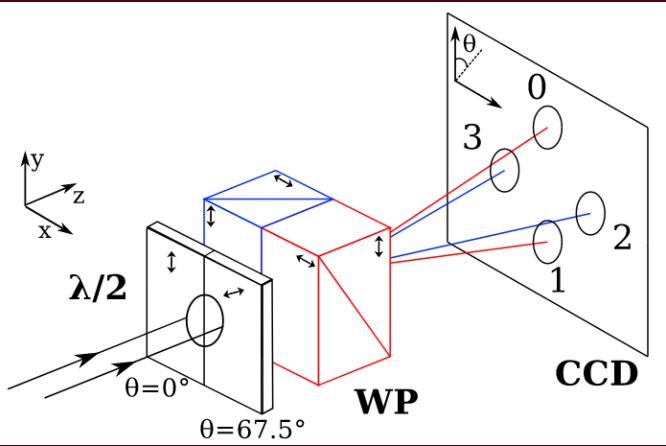
Panopoulou et al., 2015



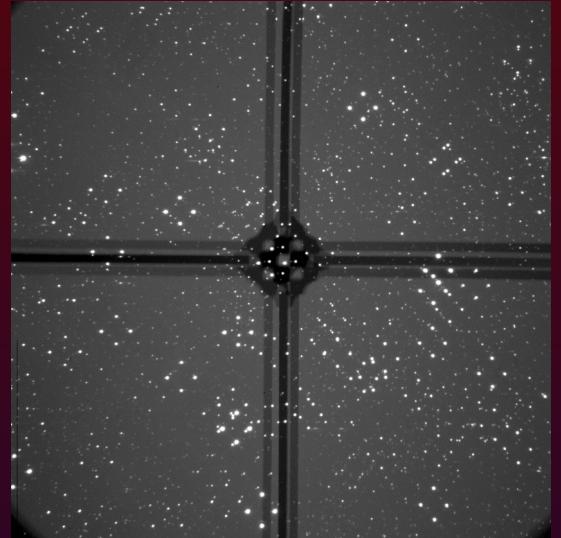
robopol.org

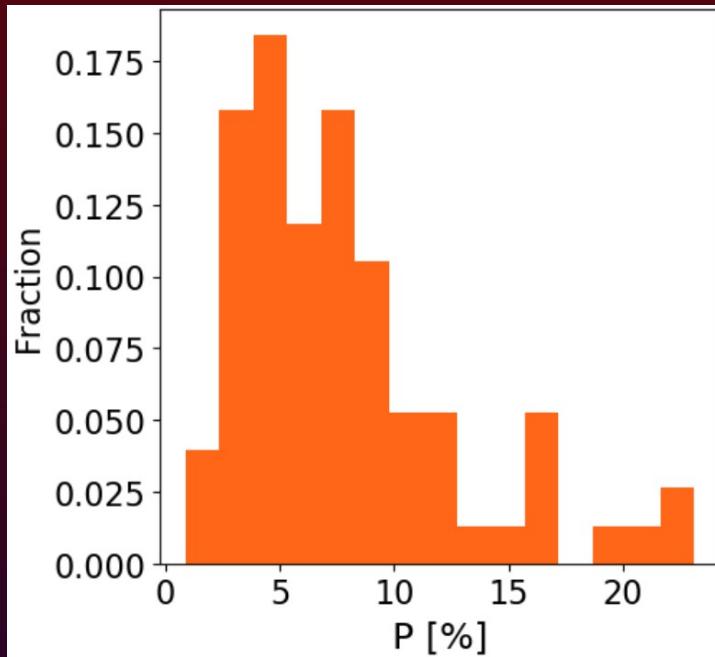


Skinakas 1.3 m telescope



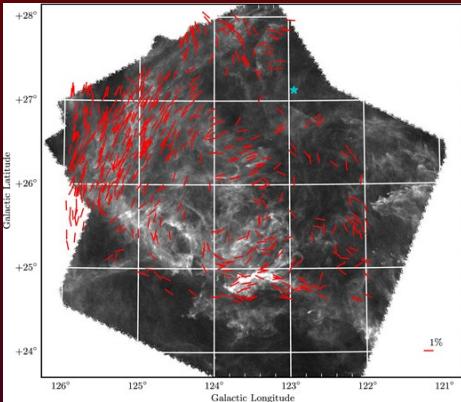
King et al., 2014





Angelakis et al., 2016

- Information of field polarization in Polaris flare cloud



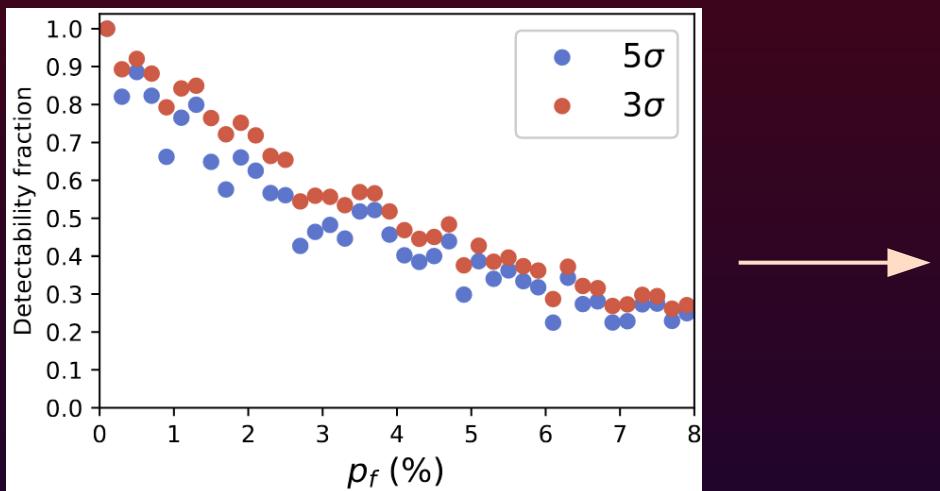
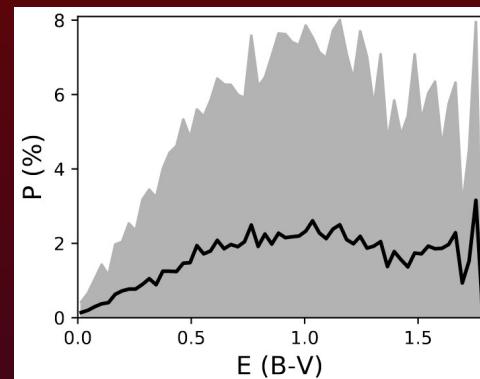
Panopoulou et al., 2015

Expectations of detection

- Info of polarization and variability of γ -loud blazars from RoboPol sample (Angelakis et al., 2016)



- Polarization data from Heiles, 7/14
- Reddening data from Schlafly et al., 2014

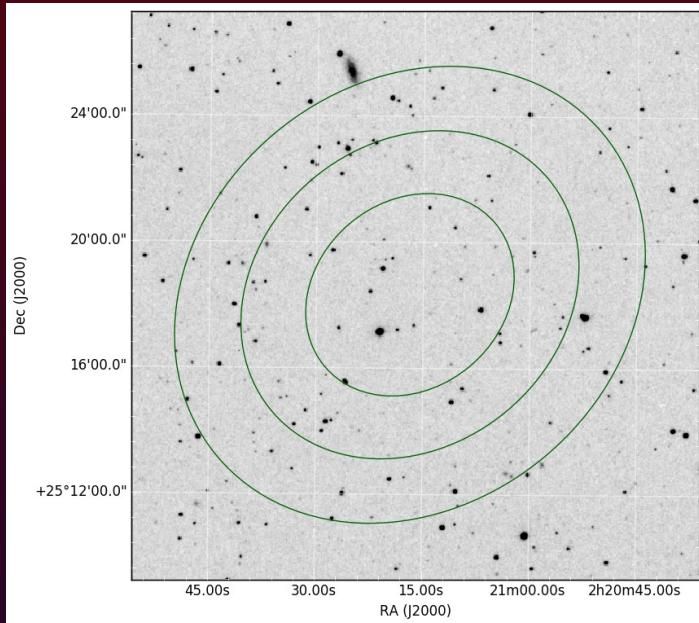


In high galactic latitudes ~80% will be detected

More than 500 AGN in all 3FGL

RESULTS

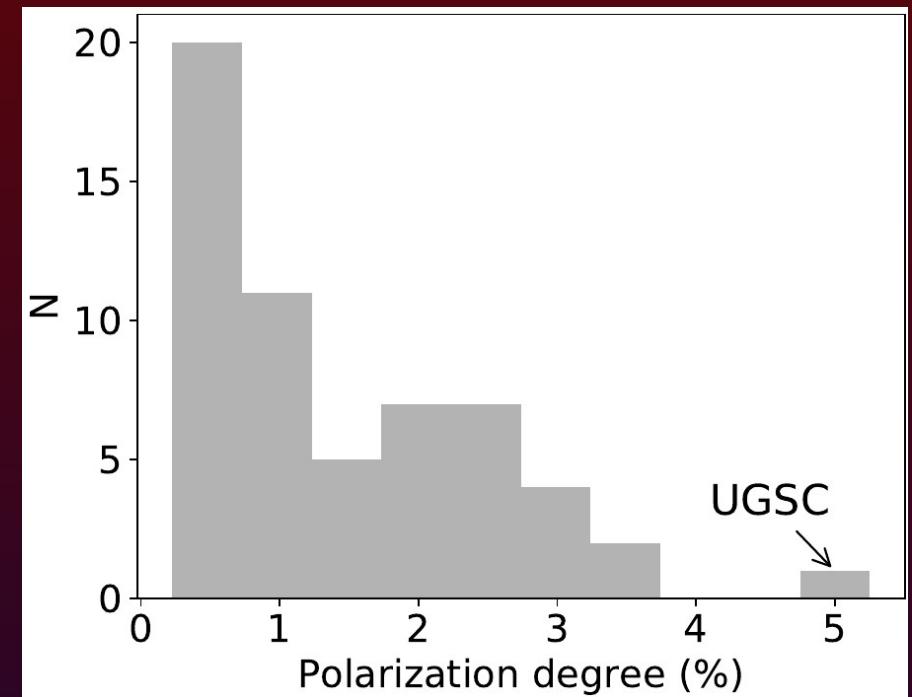
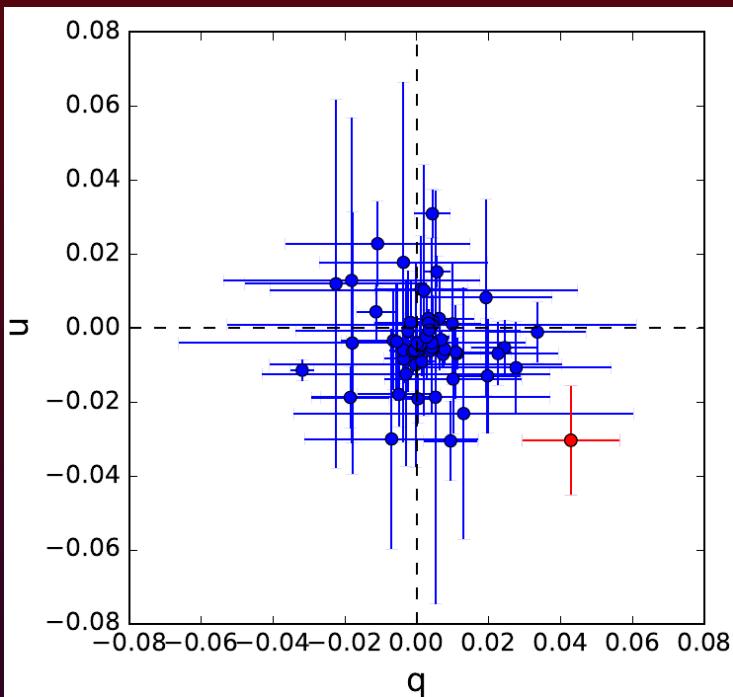
3FGL J0221.2+2518



$$p = \sqrt{q^2 + u^2}$$

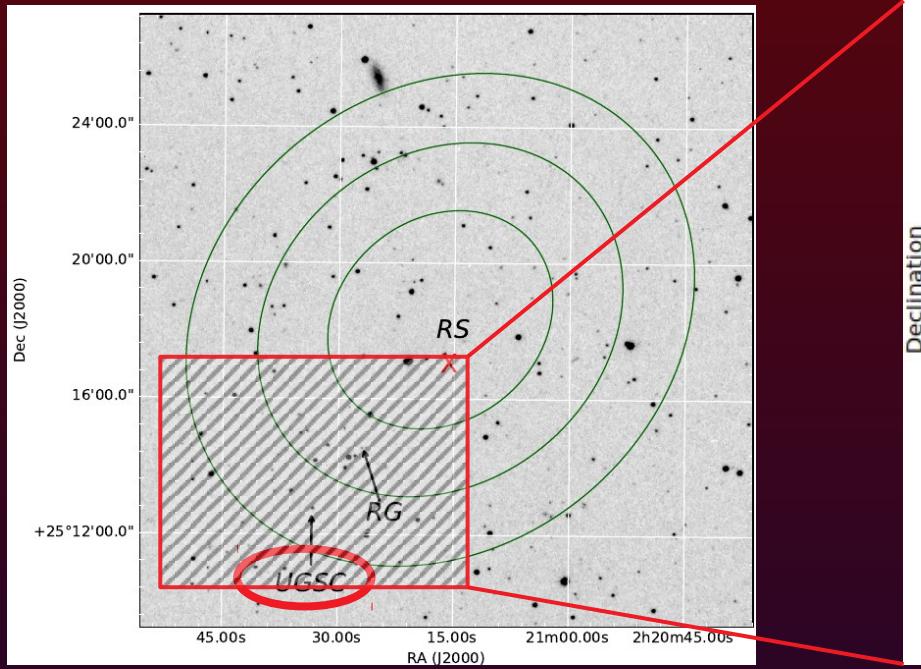
Results

9/14

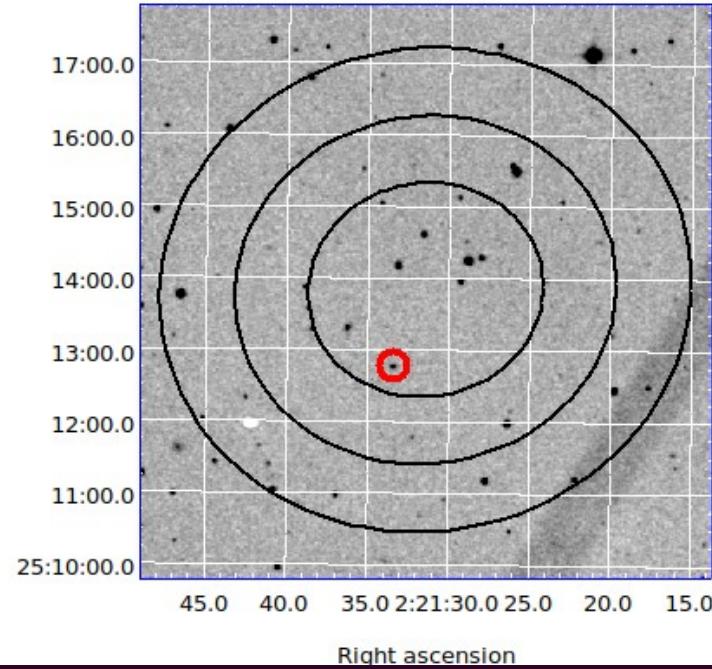


$$p_{av} = 0.91\%$$
$$p_{UGSC} = 5.2 \pm 1.3\%$$

3FGL

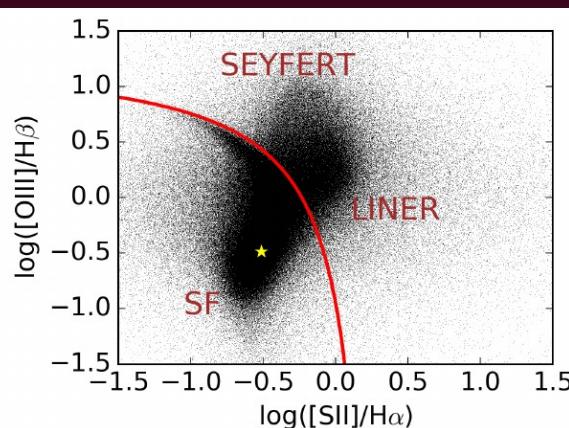
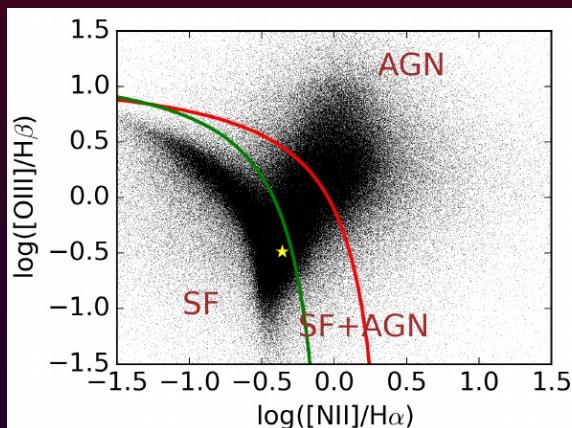
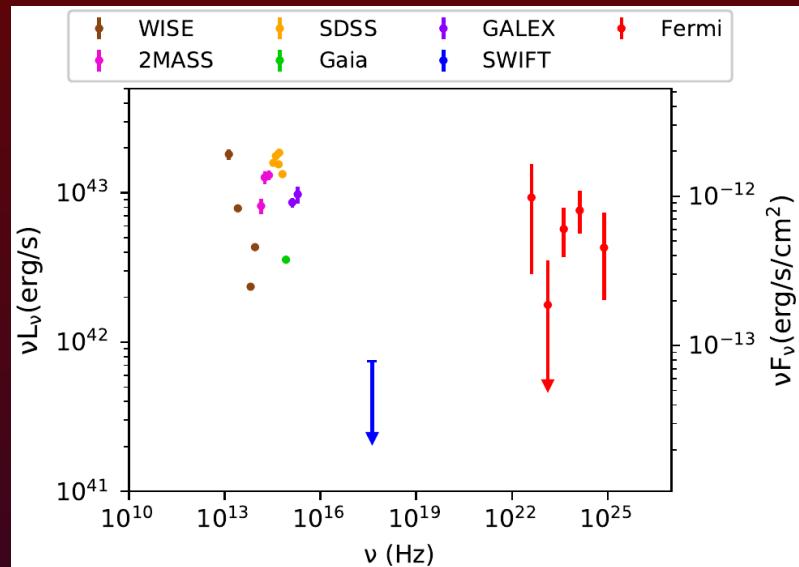
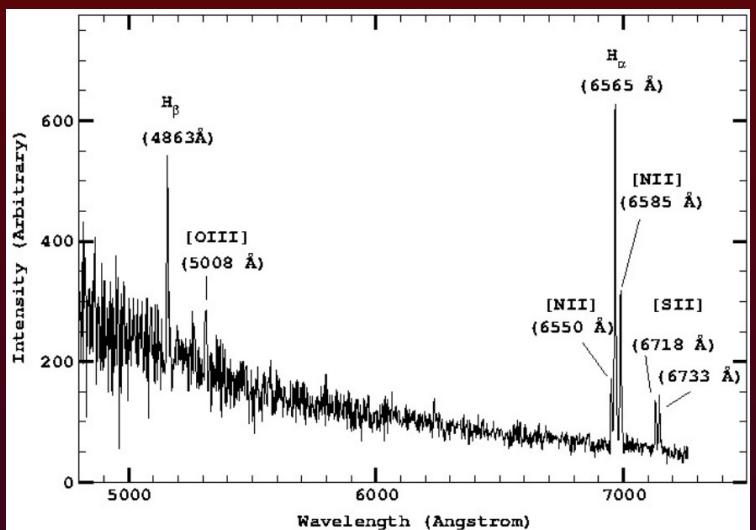


4FGL

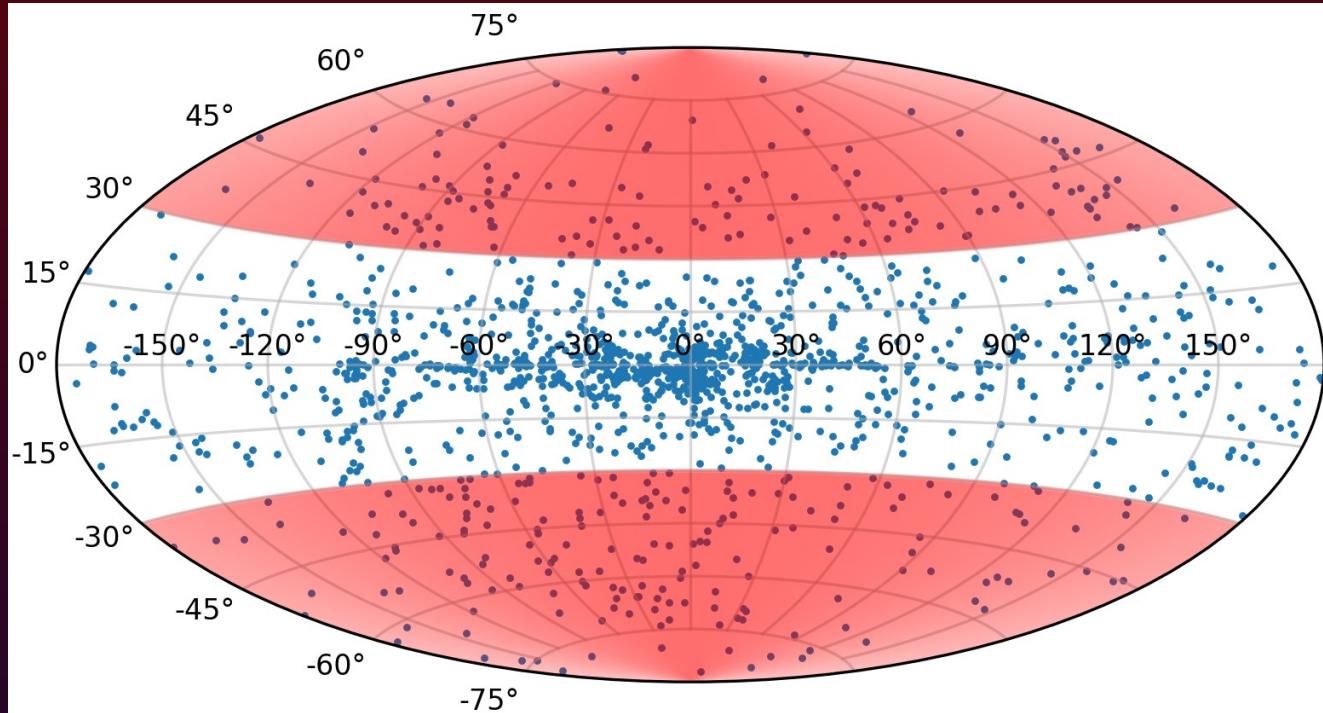


AGN nature of UGS Candidate

$z=0.0609 \pm 0.0004$



PASIPHAE: The future

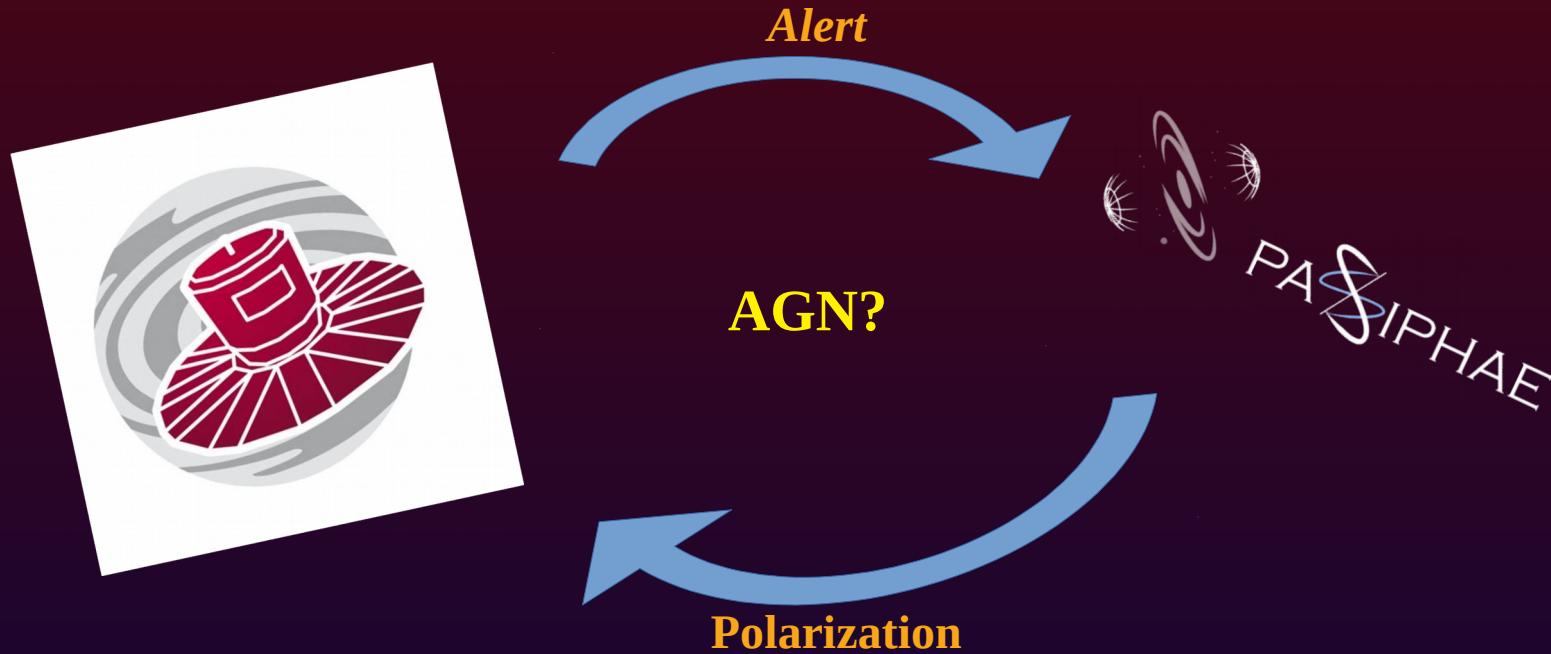


[More on PASIPHAE](#)

Tassis et al., 2018, arXiv: 1810.05652
<http://pasiphae.science/>

Keep
Take-home message

- **Polarimetry** is a *powerful and fast* tool for detecting AGN
- Extremely useful in the **BIG DATA** era



More on this work

Mandarakas et al., 2019, A&A, 623A, 61M



Contact me

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More on PASIPHAE

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<http://pasiphae.science/>