DC2 source identification with *gtsrcid*

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Outline

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DC2 source identification : method

- **Extra galactic sources :**
    - Blazar identification "à la *Mattox et al., 2001*"
    - BL Lac catalogs (*Veron-Cetty et al., 2003*), Blazars (*Sowards-Emmerd et al., 2003*)
    - Seyfert (*Lipovetsky V.A. et al., 1988*)
    - AGN (*Veron-Cetty et al., 2003*), QSO (*Veron-Cetty et al., 2003*)

- **Galactic sources**
    - pulsars (ATNF catalog)
    - SNR (*Green., 2001*)
    - LMXB & HMXB (*Liu et al., 2001*), microquasars (*Paredes, 2004*)

- **Correlation with others HE-THE experiment catalogs**
    - EGRET catalog (*Hartman et al., 1999*)
    - HESS catalog (http://www.mpihd.mpg.de/hfm/HESS/public/HESS_catalog.htm)

Method

Probability method : POSITION

angular distance between source and counterpart

$$P_{pos} = \exp\left(\frac{-\varphi}{\sqrt{\theta_{src}^2 + \theta_{cpt}^2}}\right)$$

error on the source position

error on the counterpart position

User defined probability : SNR

- Green catalog (2001), 231 SNR
- SNR are extended sources
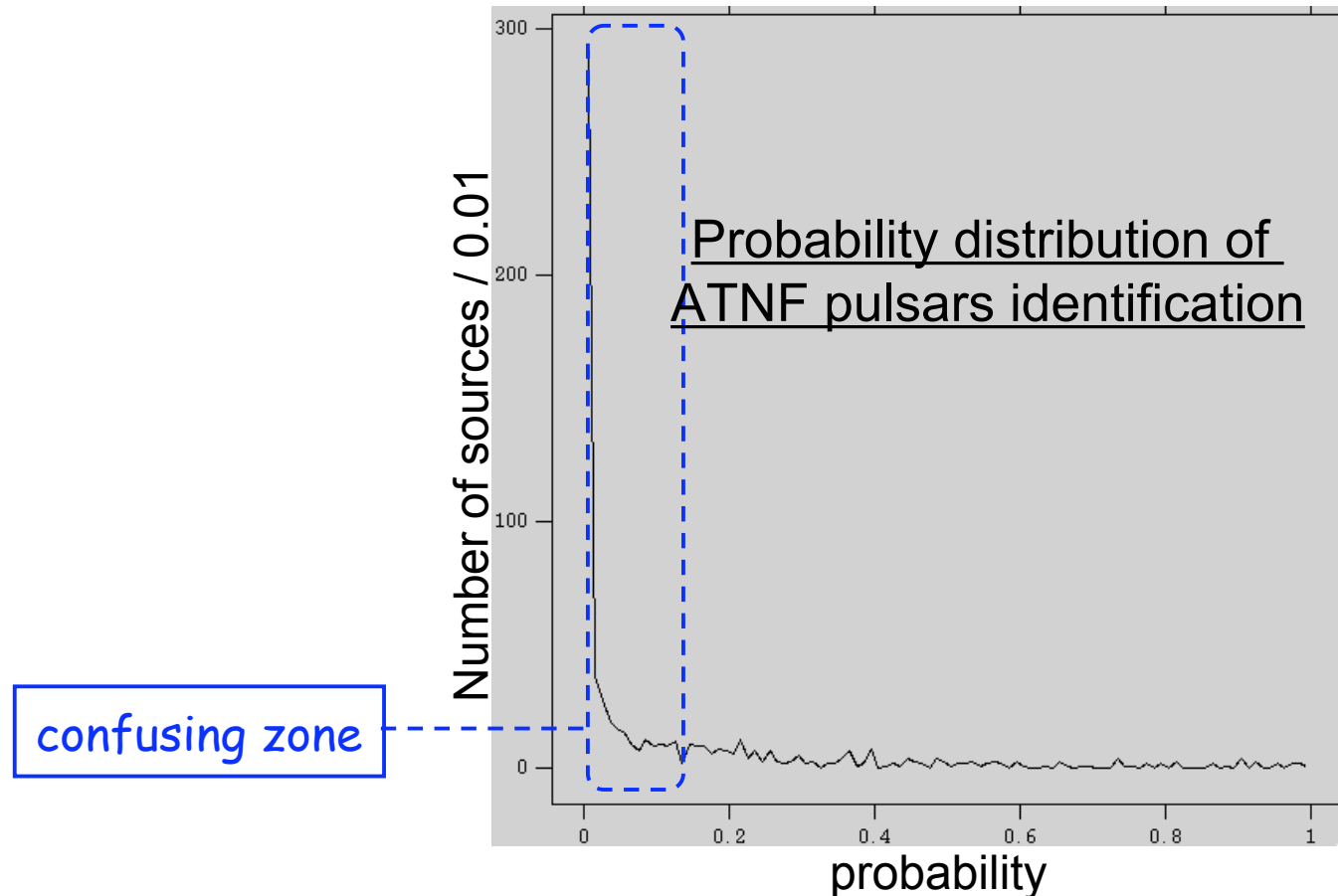 - 1.2' < extension < 310' in Green catalog
  - select extension < 60'

$$P_{pos} = \exp\left(\frac{-\varphi}{\sqrt{\theta_{src}^2 + \theta_{cpt}^2}}\right)$$

error on the source position

spatial extension of the SNR

Method : probability distribution

a tool to get a realistic value for the probability threshold

Probability distribution of ATNF pulsars identification

Method : probability distribution

a tool to get a realistic value for the probability threshold

confusing zone
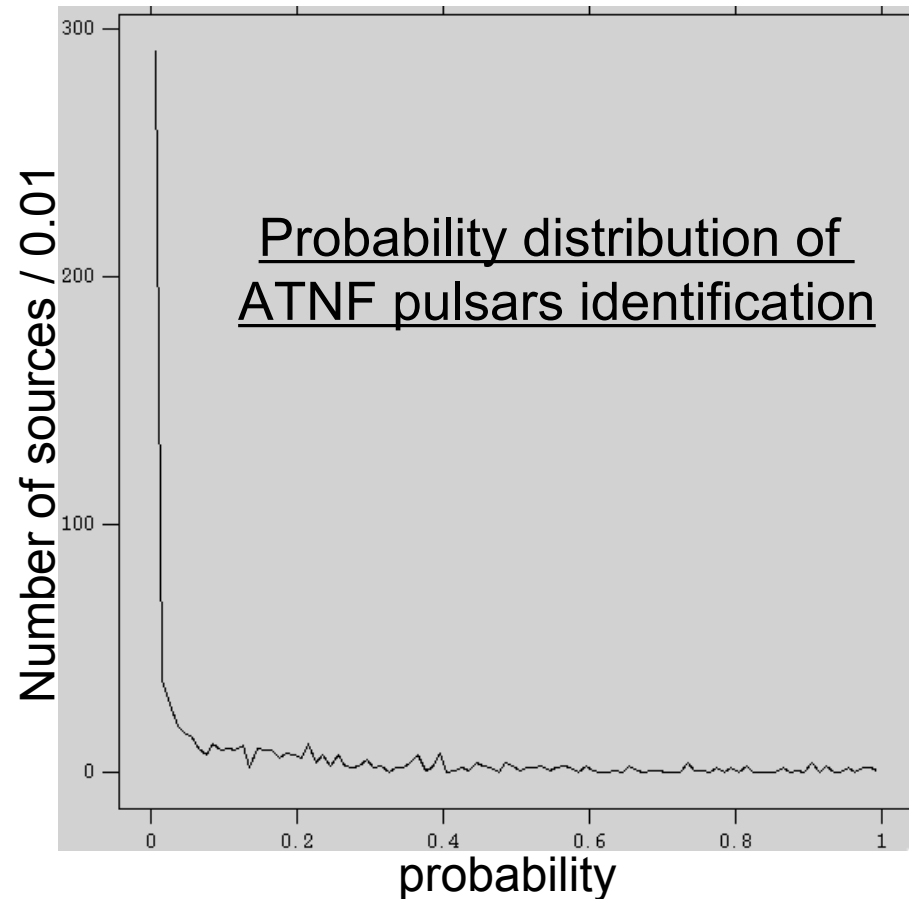
Angular distance between source and counterpart > mean angular distance
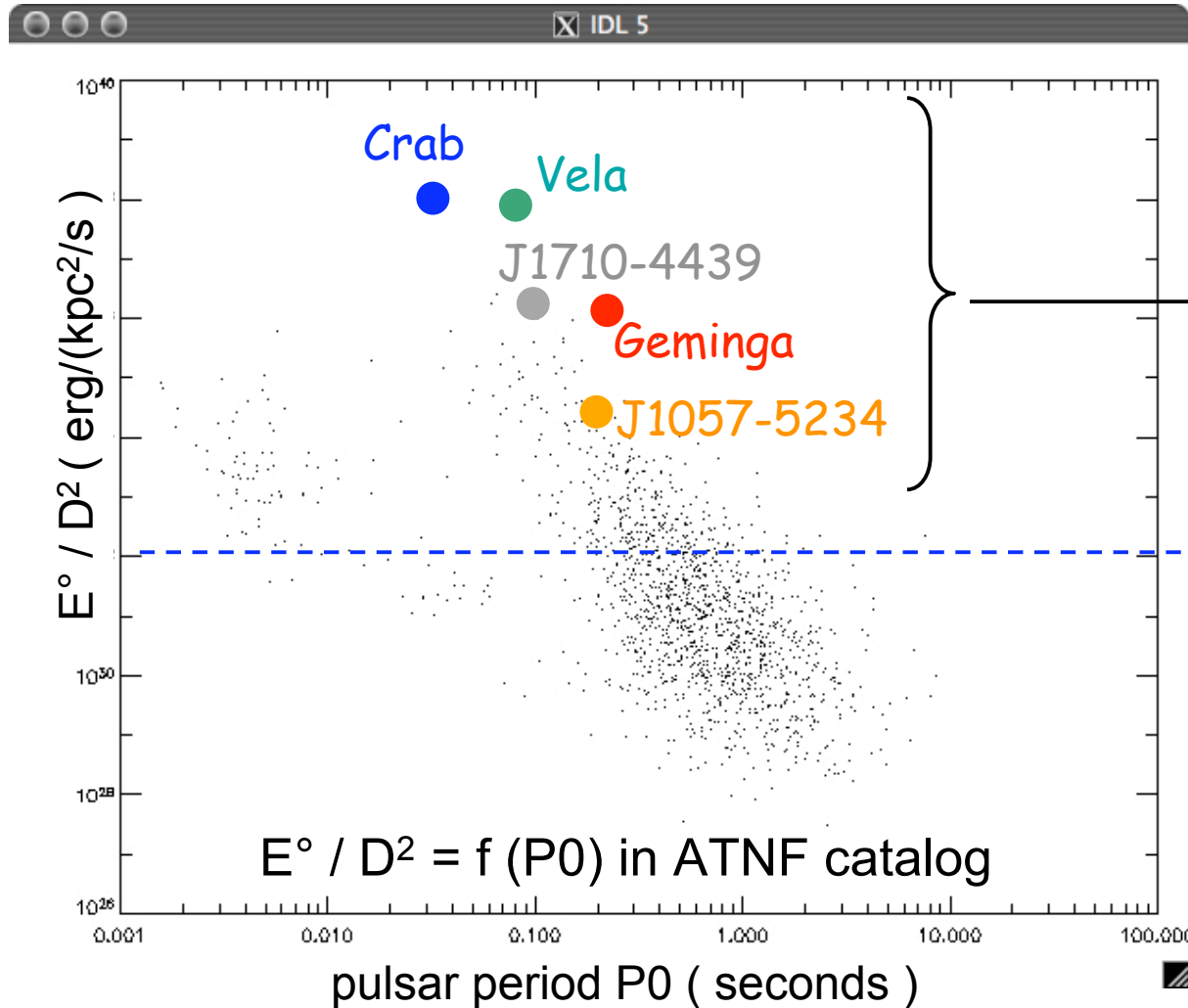in the counterpart catalog

Method : probability distribution

a tool to get a realistic value for the probability threshold

Probability distribution of ATNF pulsars identification

"acceptable" probability
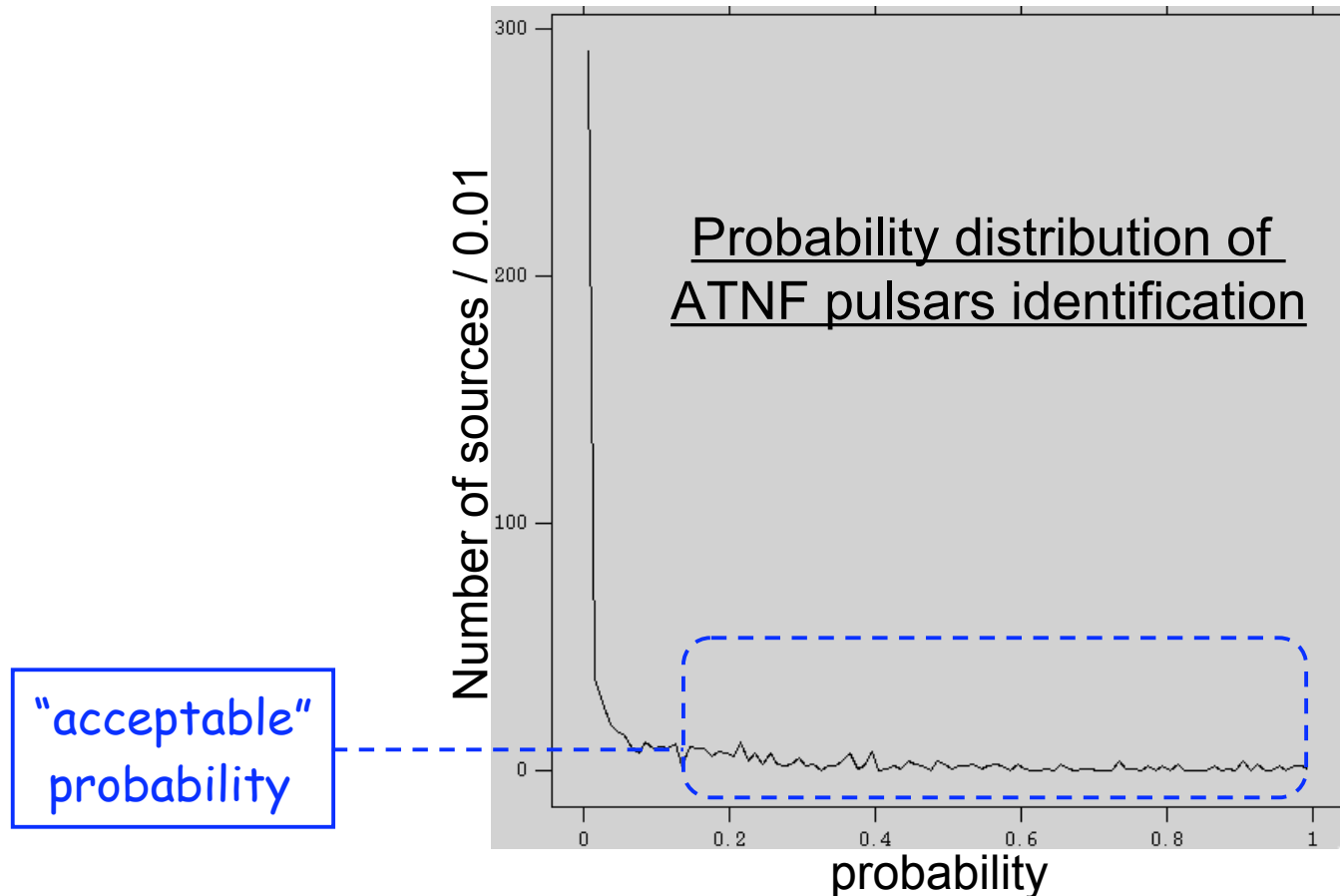
The number of identified sources still depends on the probability threshold

Method : add some physics...

Method : final results

Create a fits file with 2 columns (cpt name+prob) per LAT sources

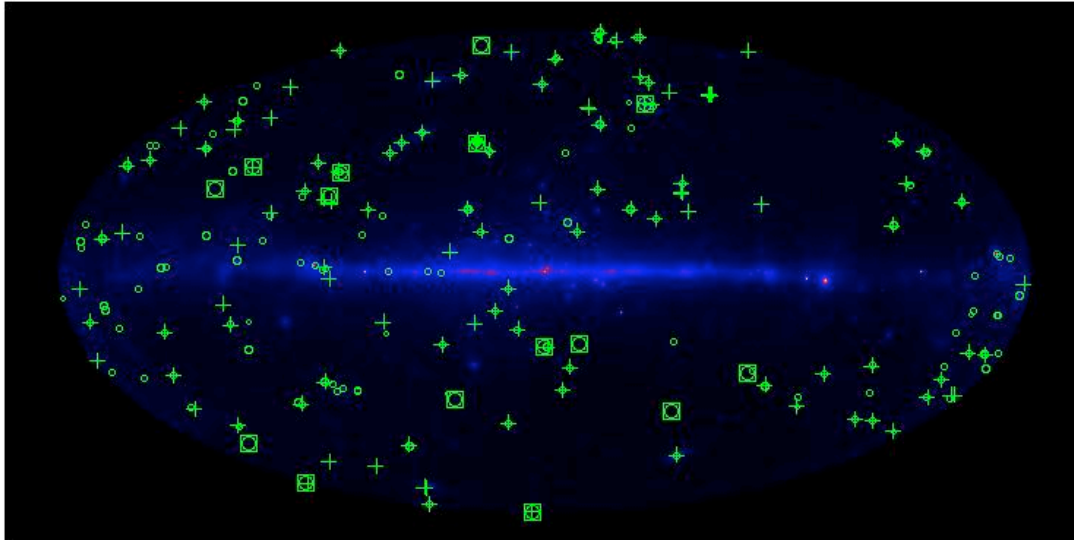Then, select a unique counterpart :

Extra galactic
- blazars
- Seyfert
- AGN & QSO

Galactic
- pulsars
- microquasars
- binaries
- SNR

Extra-galactic sources

Extra-galactic sources :

Blazars
- Mattox et al. ○ 85(114) 85
- catalog   ○   74   49
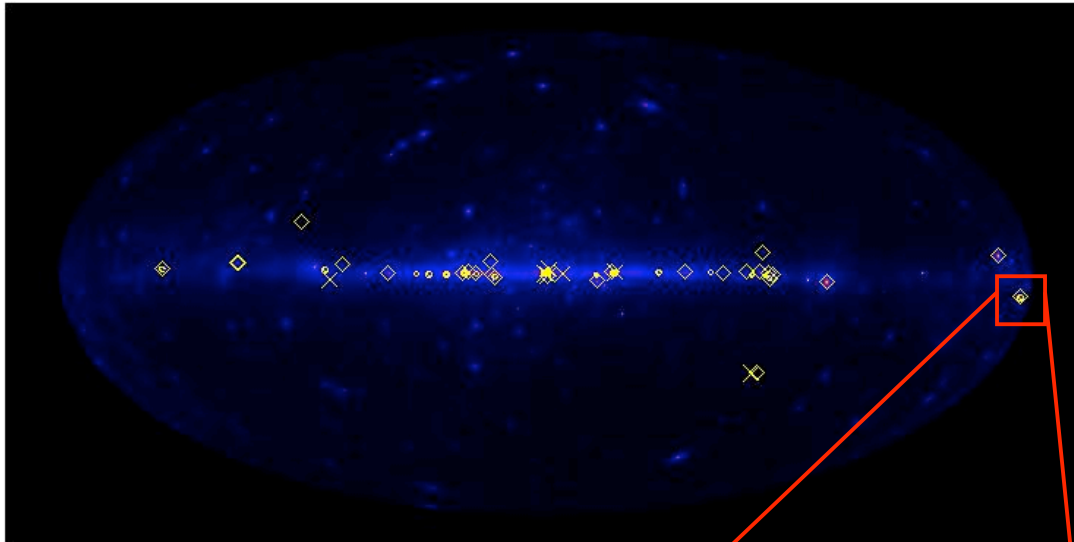Seyfert   ▢   15   9
AGN & QSO ✦ 117   26

Total number of AGN   169

Raw number for each class

Number after suppression of cross-talk
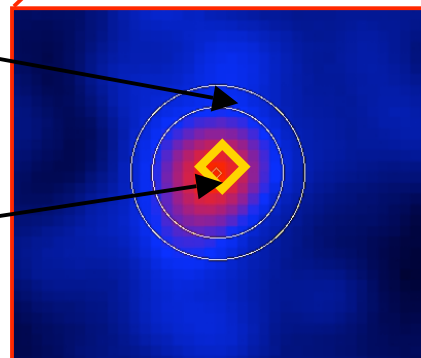between different classes
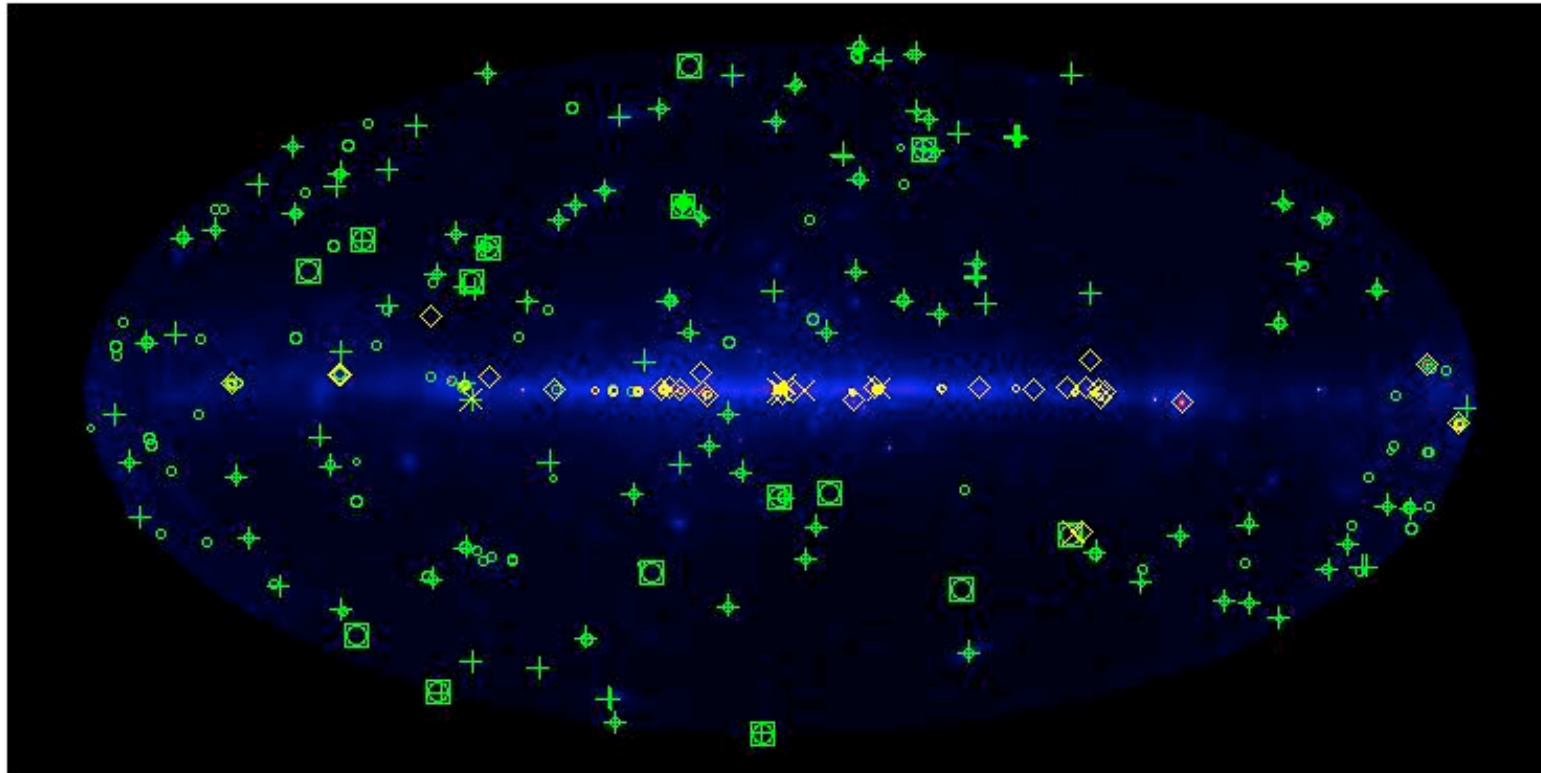
Galactic sources

Galactic sources :

Pulsar	◇	22	22
microquasars	✕	2	1
LMXB/HMXB	⬭	17	12
SNR	◎	11	4
Total number			39

Pulsar + SNR :

Crab region

DC2 source identification : summary

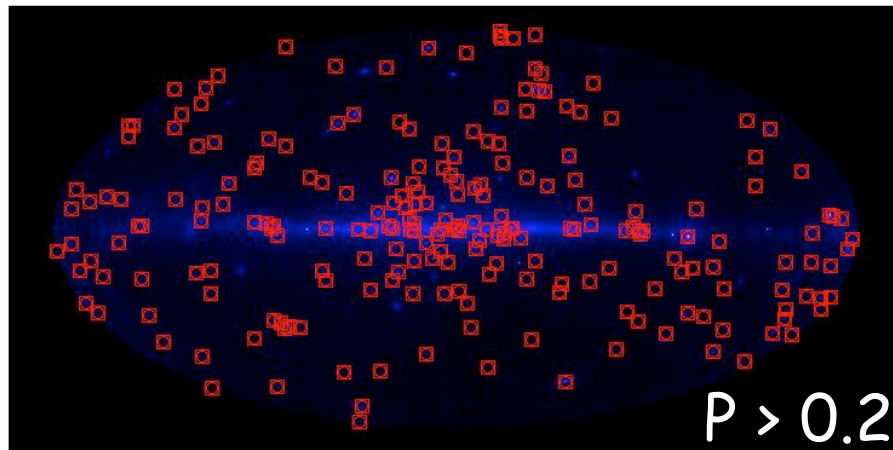Extra-galactic sources
169

Galactic sources
39

Identified sources
55 %
= f (probability threshold)
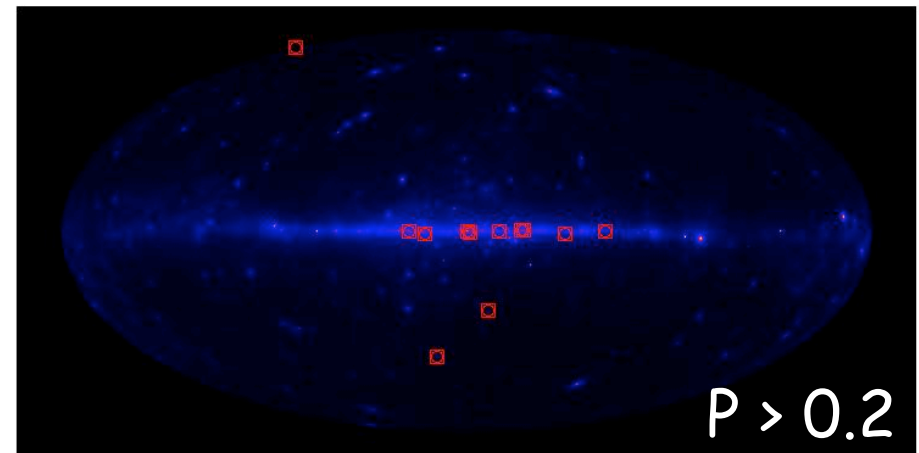
EGRET & HESS sources

EGRET sources

3EG (Hartman et al., 1999), 271 sources

P > 0.2

- Probability < 0.2   confusing
- Probability > 0.2   221 sources
- Probability > 0.5   172 sources
- Probability > 0.8   98   sources

HESS sources

HESS catalog (web site), 25 sources

P > 0.2

- Probability < 0.2   confusing
- Probability > 0.2   12 sources
- Probability > 0.5   8   sources
- Probability > 0.8   2   sources

gtsrcid associated tools : display

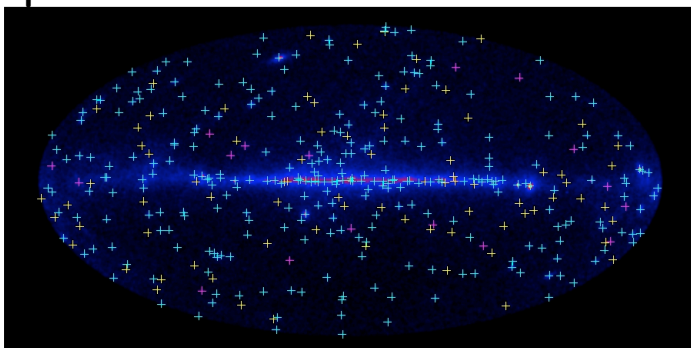**Generation of *.reg file for DS9**

- Why ?
Display *gtsrcid* output

- How ?
IDL code which read *gtscrid* output fits file, generation of *.reg file

- Output :

Implementation of a visualization routine in *gtsrcid*

- Why ?
Instantaneous and systematic check of *gtsrcid* output

- How ?
New C++ routine in *gtsrcid*, generate a *.ps file

On-going…   *.reg ?

gtsrcid associated tools : tutorial

http://www.cesr.fr/~lonjou/gtsrcid_DC2_tutorial/index.html

Provides methods with examples of use

Provides catalogs

SOON… provides *gtsrcid* associated tools

…ideas and wishes are welcome

Conclusion

- ## DC2 source identification

  - 55% of identified sources

  - 169 extra-galactic sources (85 blazars)

  - 39 galactic sources (22 pulsars)

- ## *gtsrcid* evolution

  - DC2 feedback

  - Comparison with others groups results

  - Work on methods accordingly