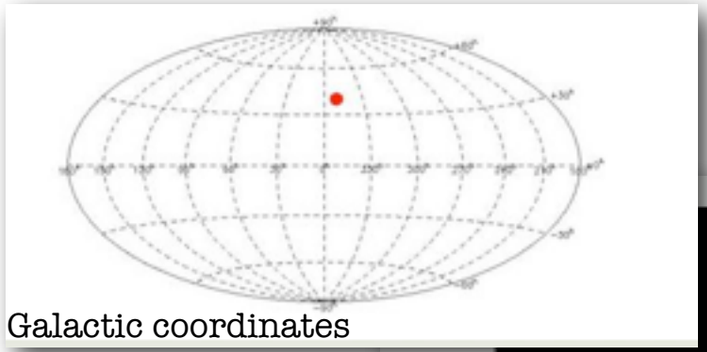
PKS 1510-089

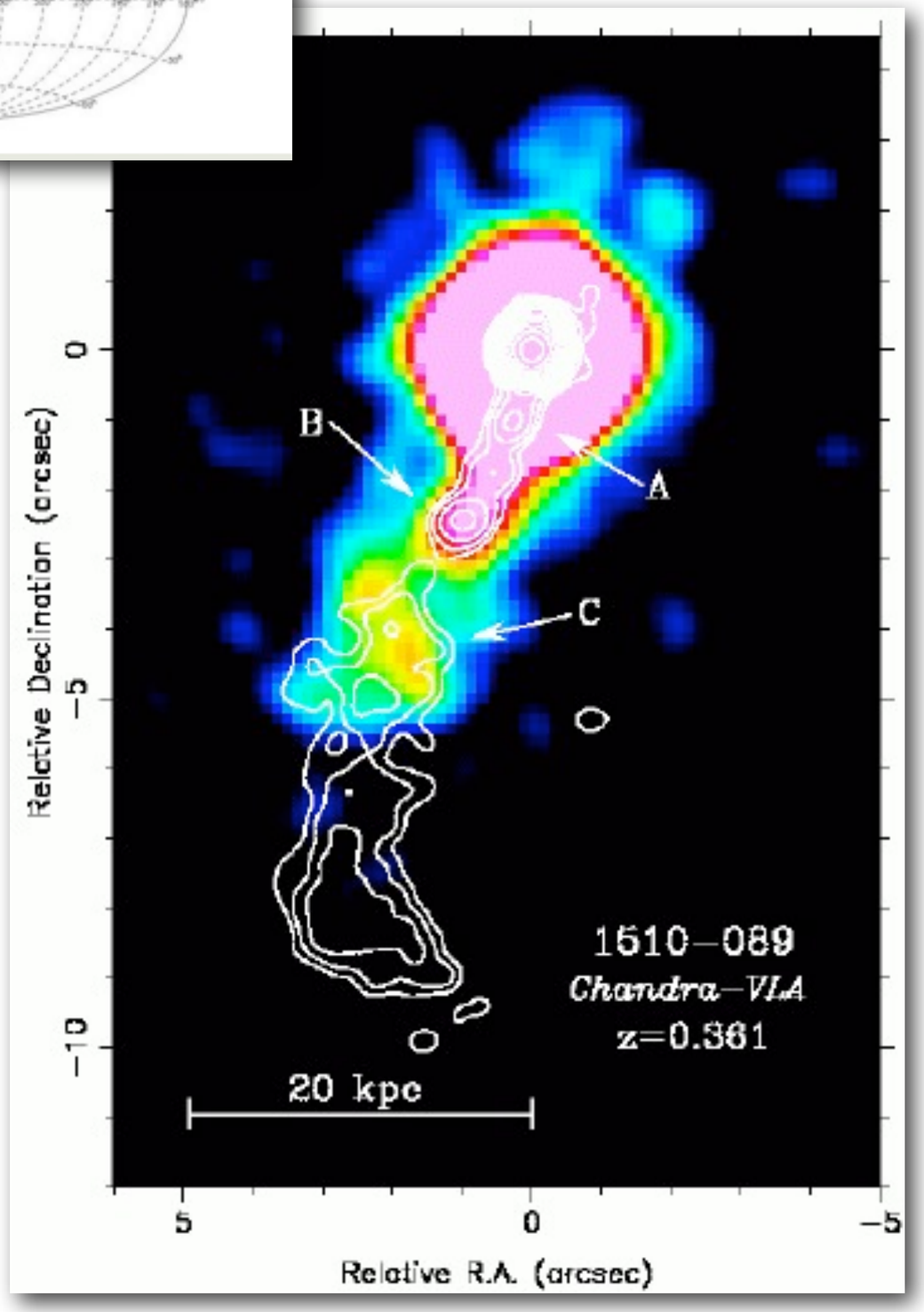

Galactic coordinates

FSRQ

z=0.361

Nh(Gal)=6.99e20 cm-2
(Kalberla et al. 2005)

Apparent velocity: 1263 ± 27 μas/y ; 28.00 c
(Lister et al. 2013, AJ, 146, 120)



Reference:
Sambruna et al. 2004, ApJ, 608, 720

1. Spectral and Imaging Analysis

➡ Chandra: Superposition of the X-ray and radio images (DS9) to individuate the regions to be analyzed in the jet.

➡ Chandra: Knot B and C- extraction of the spectrum and production of the .rmf and .arf files (CIAO). Spectral analysis with XSPEC. Definition of the best data model: parameter uncertainties, confidence (68%, 90%, 99%) contour plots, flux and luminosity.

➡ Swift/XRT: Spectral analysis of the nucleus with XSPEC. Definition of the best data model: parameter uncertainties, confidence (68%, 90%, 99%) contour plots, flux and luminosity.

➡ AGILE: Spectral analysis (spectral slope and flux); time variability of the gamma-ray counterpart of PKS1510-089; TS map

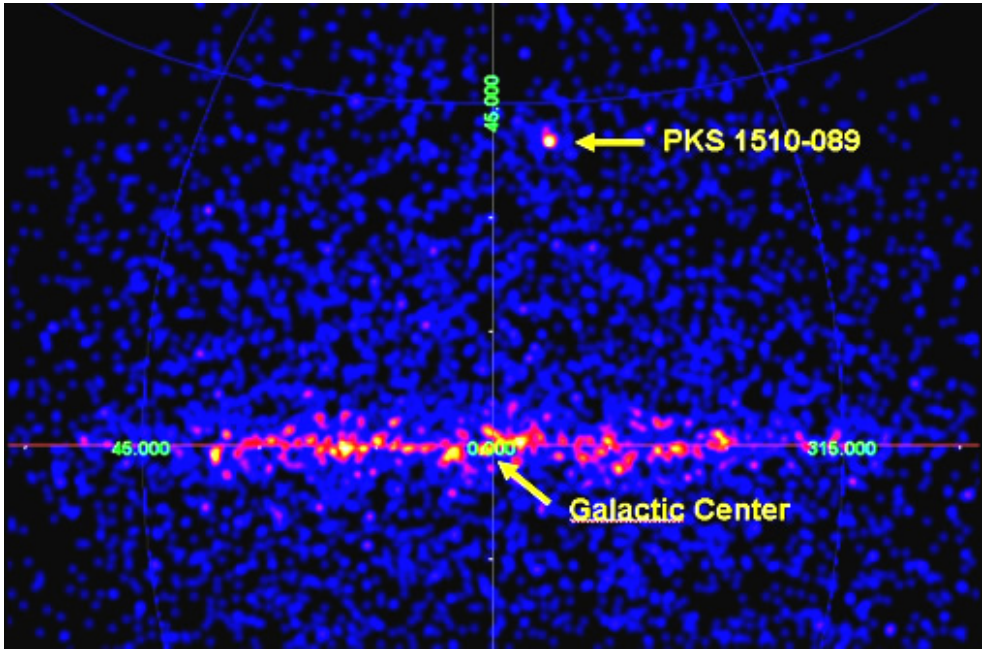
➡Estimation of the size of the gamma-ray source

➡ Construction of the Spectral Energy Distribution (optional)

PKS 1510-089 - AGILE

The blazar PKS 1510-089 in Gamma-rays

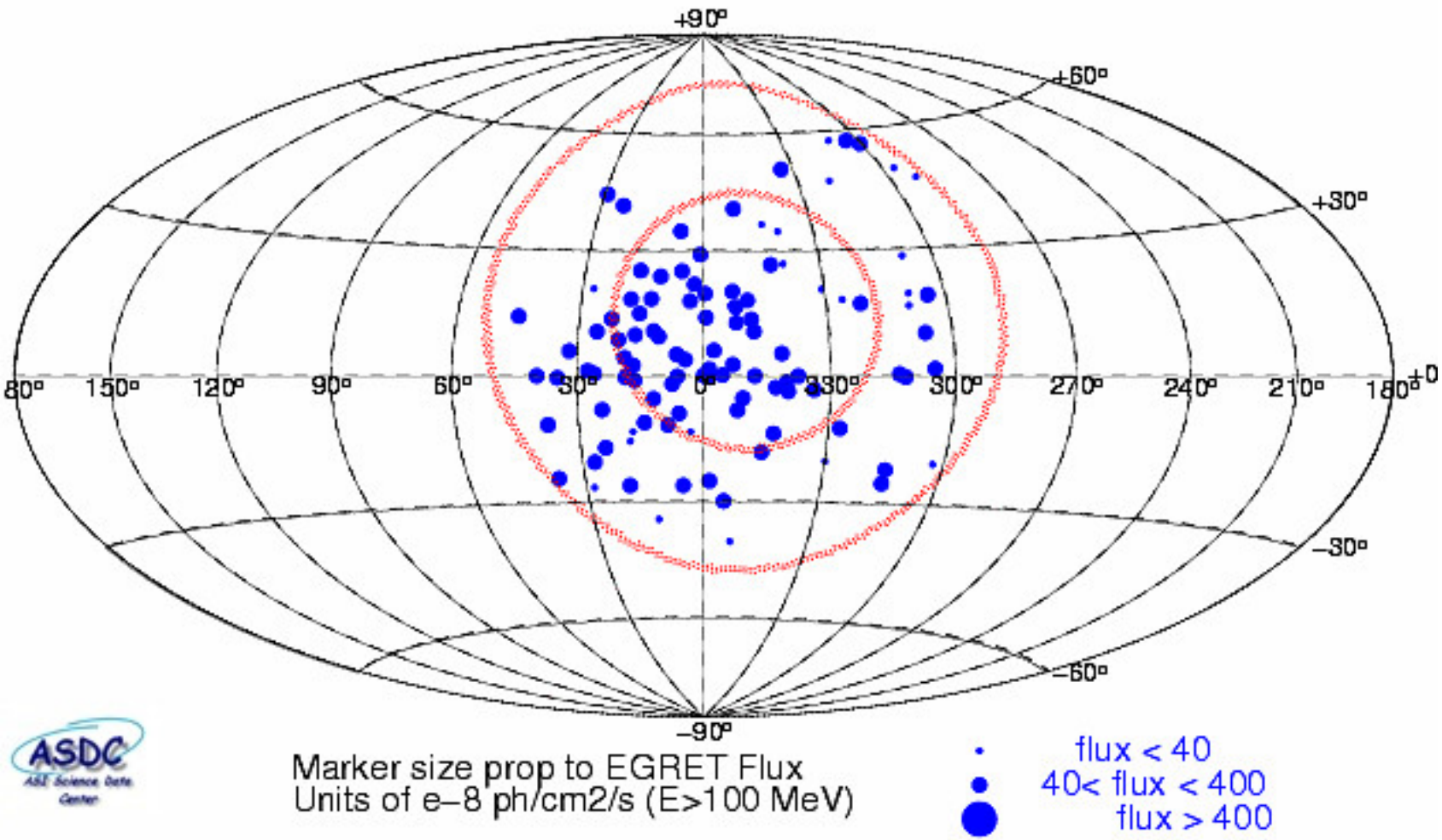
- Blazars characterized by strong non-thermal emission across the entire electromagnetic spectrum (from radio to Gamma-ray energies)
- PKS 1510-089 characterized by very intense and variable Gamma-ray emission detected by AGILE and Fermi satellites
- **In March 2009, an extraordinary Gamma-ray activity was detected by AGILE: a science alert was immediately sent to the Astronomical community (ATel 1957) triggering 15 Swift Target of Opportunity (ToOs) observations (see P. Grandi tutorial)**
- Today we analyze the AGILE observation of PKS 1510-089 in March 2009



The blazar PKS 1510-089 in Gamma-rays/2

AGILE observation:

OP06800 → 2009-02-28T12:00:00 (54894.50) 2009-03-31T12:00:00 (54921.50)



The blazar PKS 1510-089 in Gamma-rays/3

…. After the X-ray analysis:

1) Use all the data (MJD 54894.50-54921.50) to

1.1) calculate flux, best position and spectral index (fixflag=7 energybin=3)
- use calculated spectral index for light curve 2)

1.2) generate counts map in the energy range 100-50000 MeV (energybin=0)
- display the map (ds9)
- open reg file to check positioning

2) Light curve (energybin=0)
- generate maps with a temporal bin of 4 days (at least 4 bins starting from 54894.50)
    - change tstart, tstop
- analyze maps with fixflag=3.
    - check position
    - save sqrt(TS), flux and flux error, start time of the temporal bin
- plot the light curve

3) Compute the dimension (upper limit) of the emitting region from the flux variability (see x-ray analysis slides)

4) Calculate flux for each energy bin (see 1))

5) Make SED with Swift analysis results (OPTIONAL)

The blazar PKS 1510-089 in Gamma-rays/4

References for PKS 1510-089:

- Pucella et al., 2008, A&A, 491, L21
- Dammando et al, 2009, A&A, 508, 181
- Dammando et al, 2011, A&A, 529, A145

Links:

- AGILE at ASI/ASDC: http://agile.asdc.asi.it
- **AGILE App (AGILEScience**

Interested in AGILE data analysis? See the list of proposed thesis or ask A. Bulgarelli