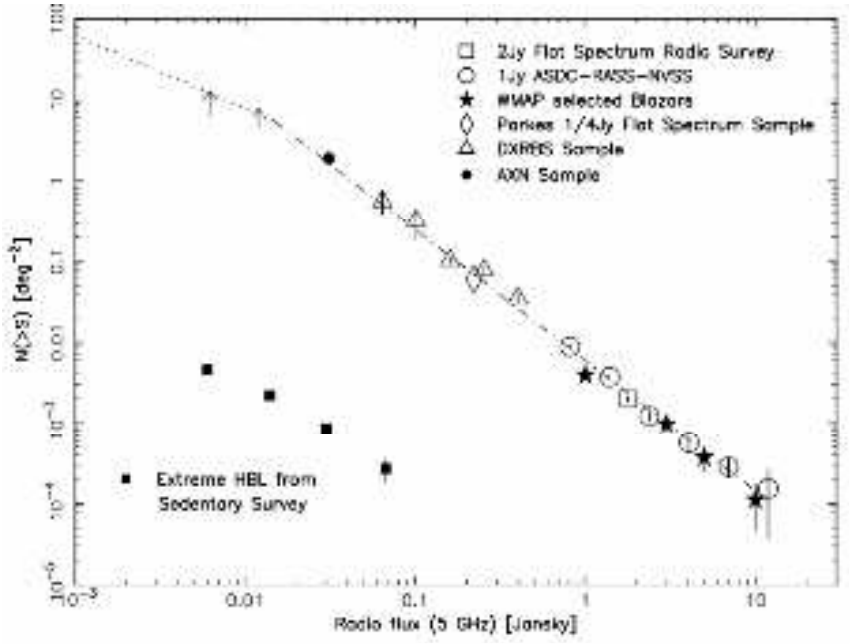
Simulated Blazar Surveys

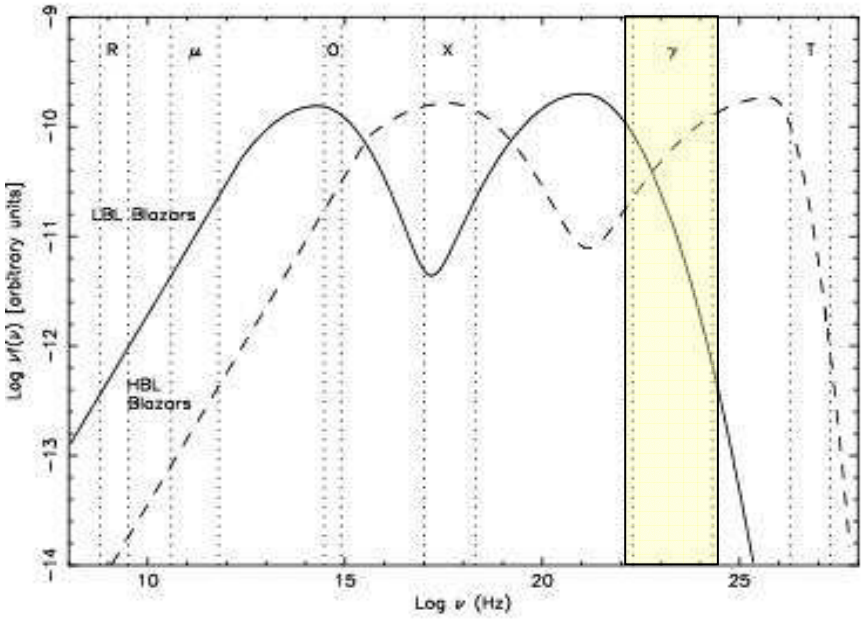
(PRELIMINARY RESULTS)

P. Giommi

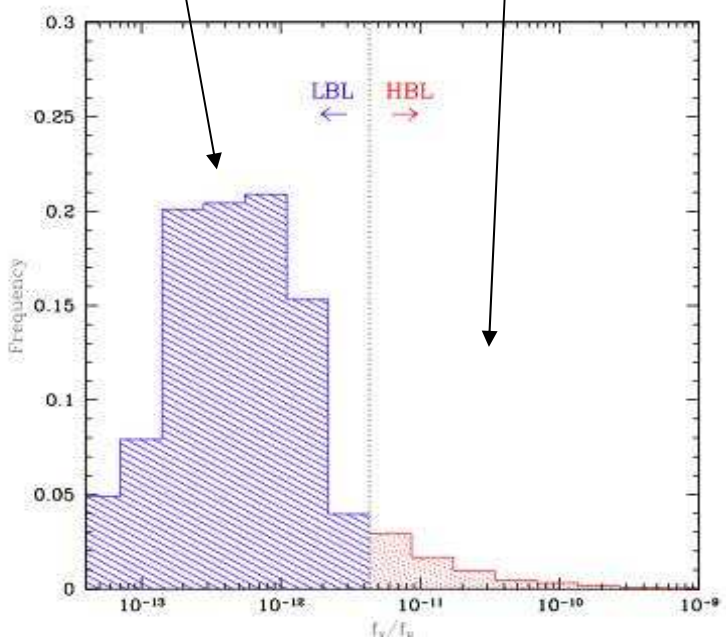
Simulations main properties and parameters

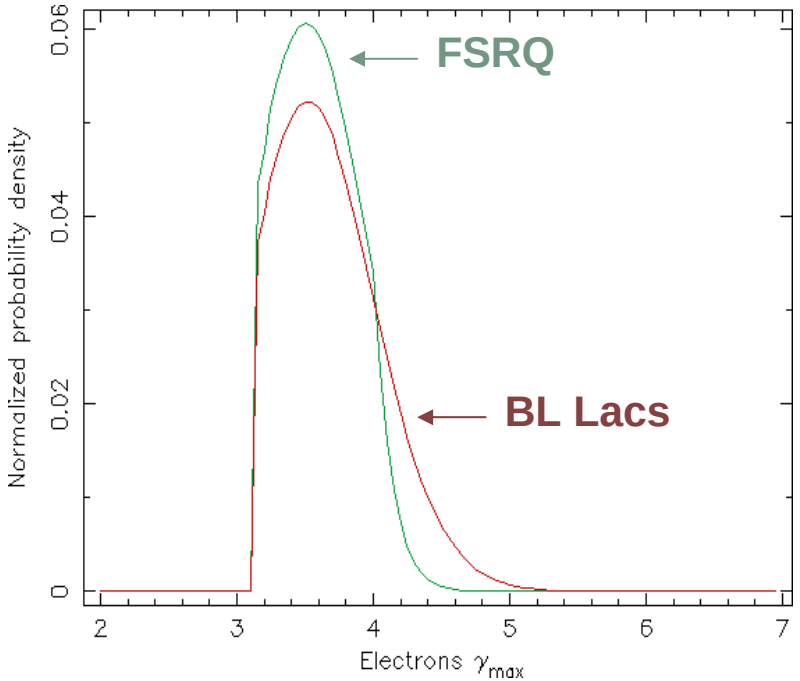
- Starts from a radio Luminosity function + Cosmological evolution
  - Monte Carlo simulation of redshift and radio luminosity
- Radio luminosity of each source is extrapolated to other energy bands (micro-wave, optical, X-ray, gamma-ray) based on SSC model + and randomized based on observed distributions.
- Gamma-ray flux simulated taking into account of duty cycle and GRB constraints (see Giommi et al. 2005 A&A in press, astro-ph/0508034)
- Sources are accepted above a set of flux limits (radio, opt , X-ray etc.) that can be a function of the position in the sky
- Results are written to a DBMS





FSRQ + BL Lacs **BL Lacs only**





Checking the simulations against the RASS-NVSS-GSC2 Blazar candidates

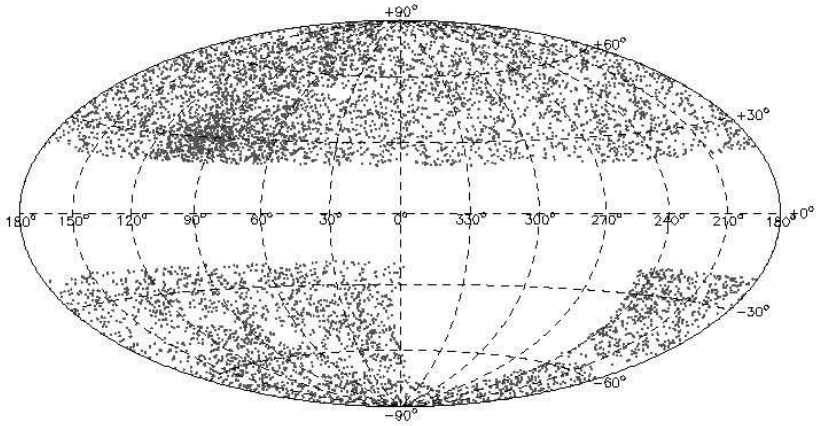
Cross-correlation between NVSS (radio) and RASS (X-ray) surveys.

Optical magnitudes from GSC2
(assuming Jmag < 19.5 when no counterpart is found in GSC2)

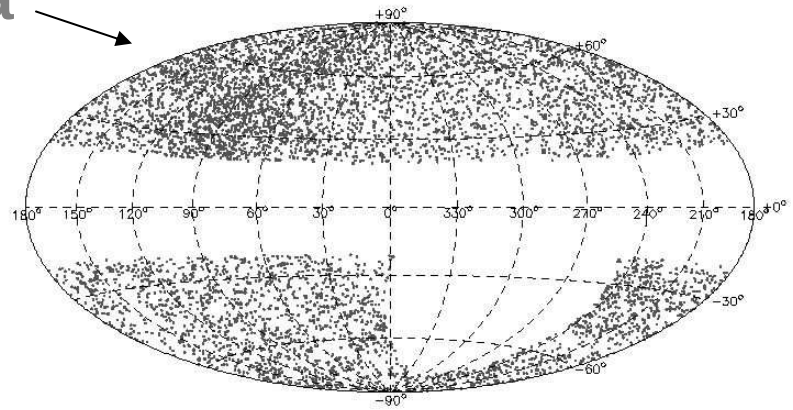
Over 7400 Blazar candidates

- $\Delta_{r\text{-}x} < 2.5\ \sigma_{r\text{-}x}$ **- and < 0.8 '**
- α_{ox} **and** α_{ro} **within Blazar area**

Real data



Simulated data

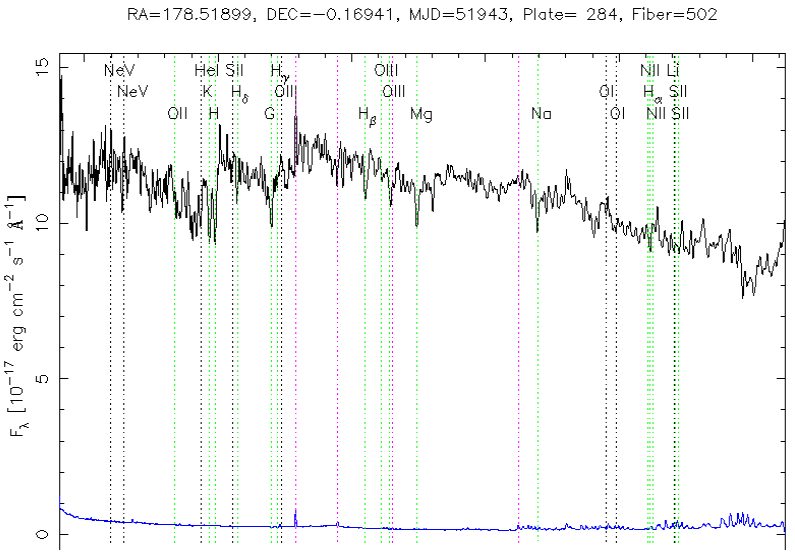


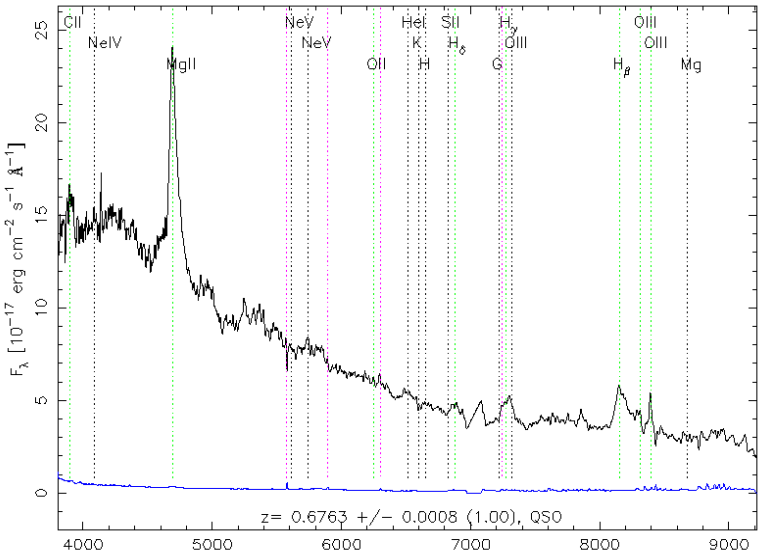
RASS-NVSS Blazar Sample:

Identification through Optical spectroscopy using SDSS-DR3 spectra

Turriziani et al., in

514 SDSS spectra in Data Release 3
152 BL LACS [59 new objects]
164 FSRQs [128]
68 QSOs [36](no radio spectral info)
63 SSRQs [62]
32 Radio gal/BL Lac transition objects

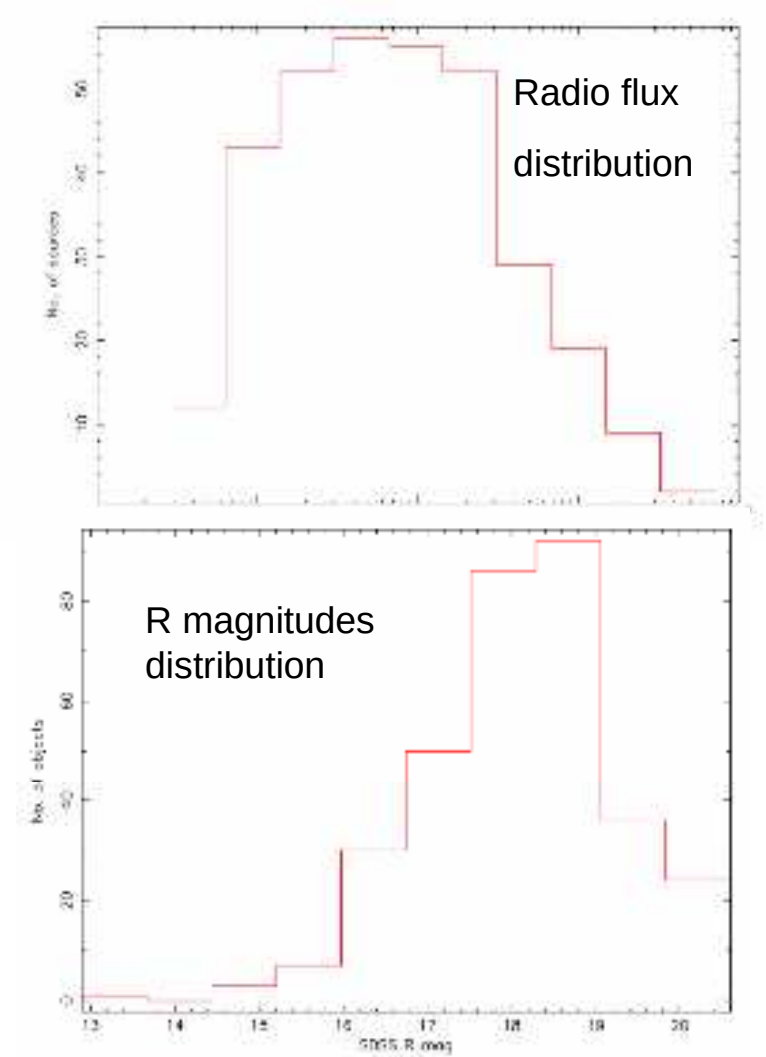


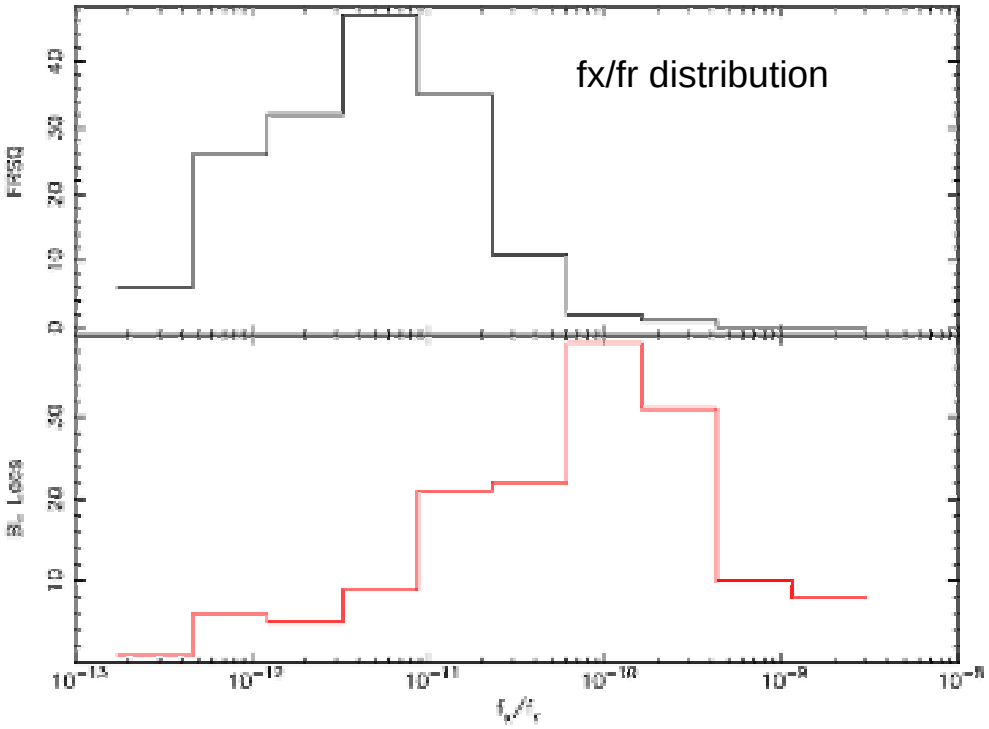


~68% are genuine Blazars
~13%QSO with unknown radio spectrum
~12% are steep radio spectrum QSOs
~ 7% are other AGN or galaxies

RASS-NVSS-SLOAN Blazar Sample: results

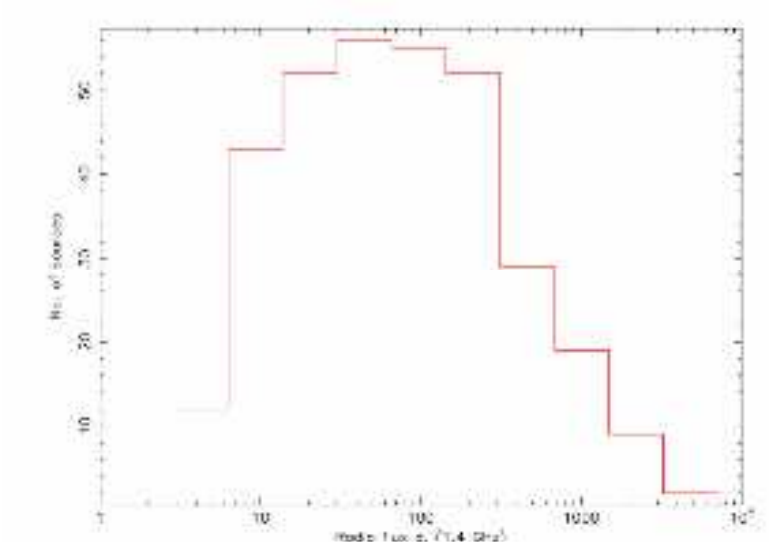
Turriziani et al. 2005, in preparation



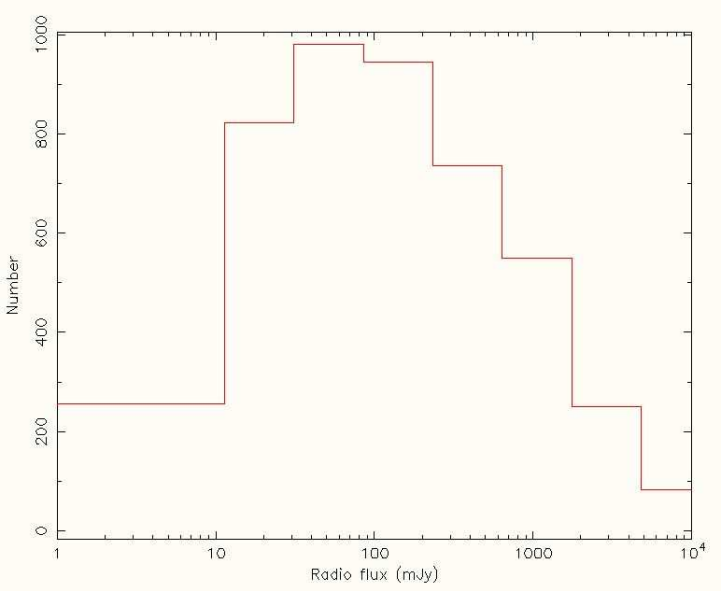


Radio flux distributions

Data from RASS-NVSS-SLOAN
Blazar Sample

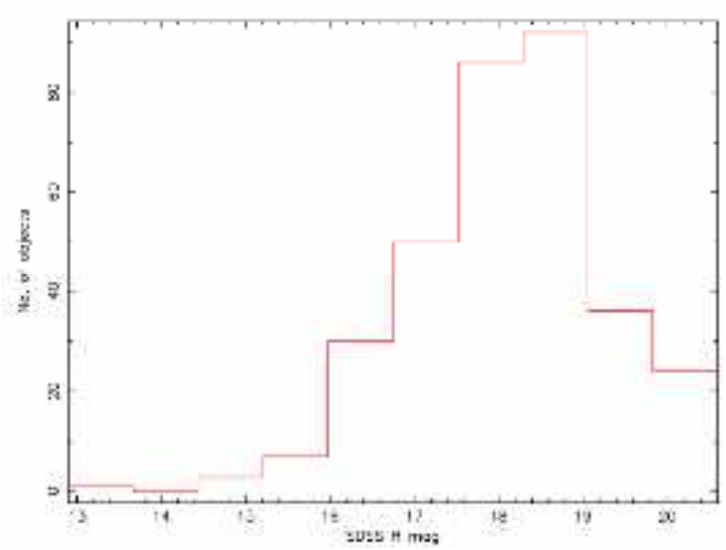


Simulation

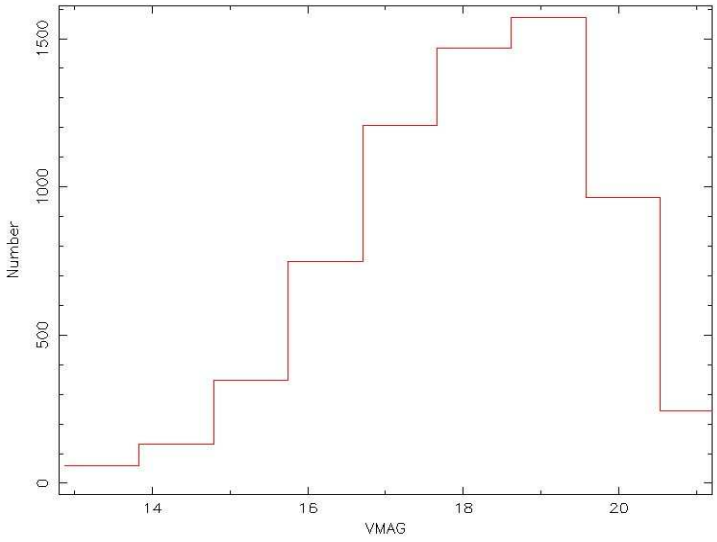


Magnitude distributions

Data from RASS-NVSS-SLOAN
Blazar Sample

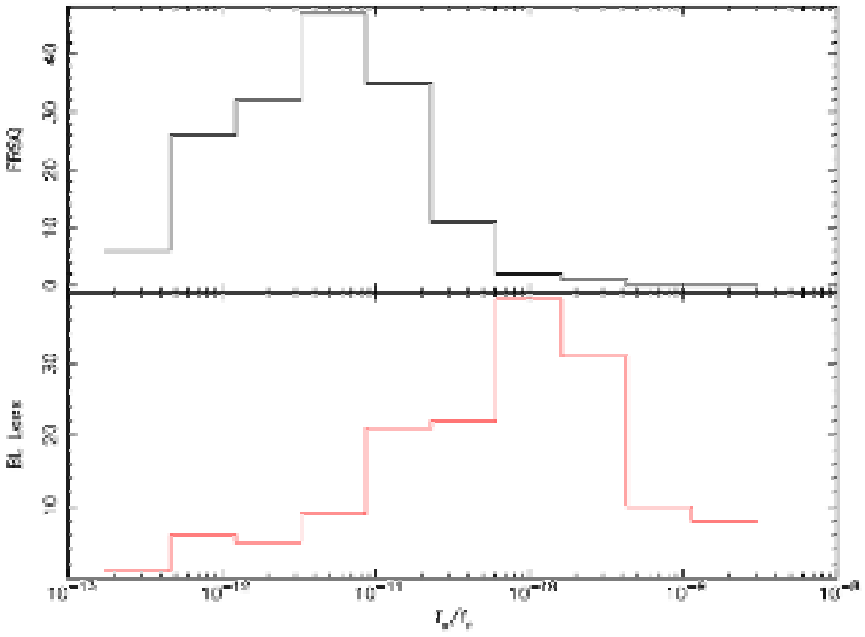


Simulation

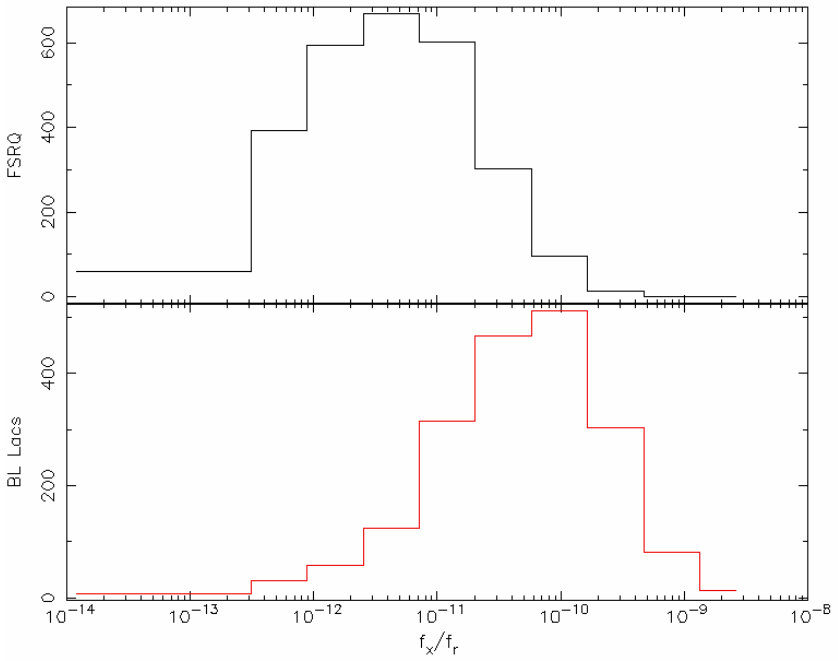


fx/fr distributions

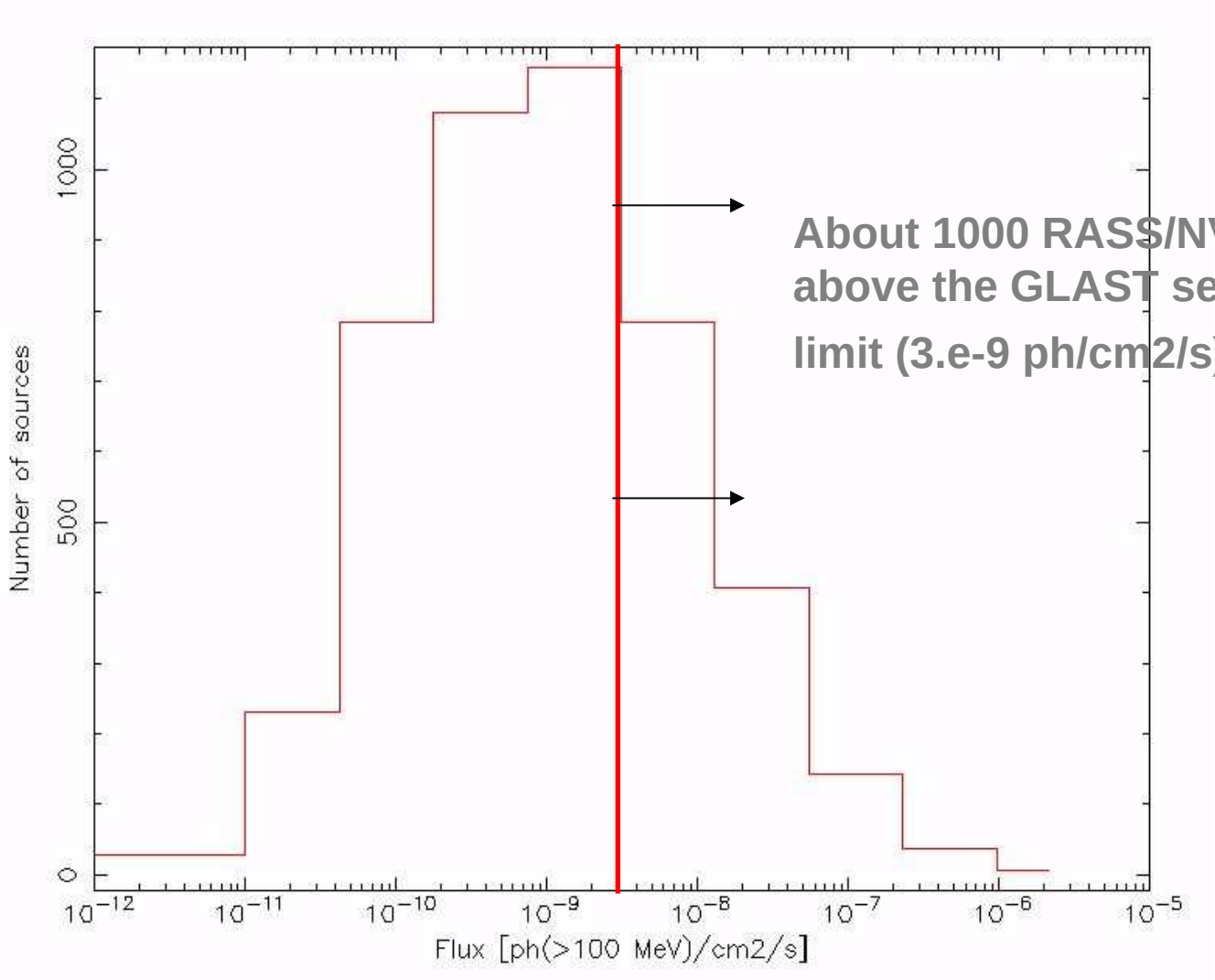
Data from RASS-NVSS-SLOAN
Blazar Sample



Simulation



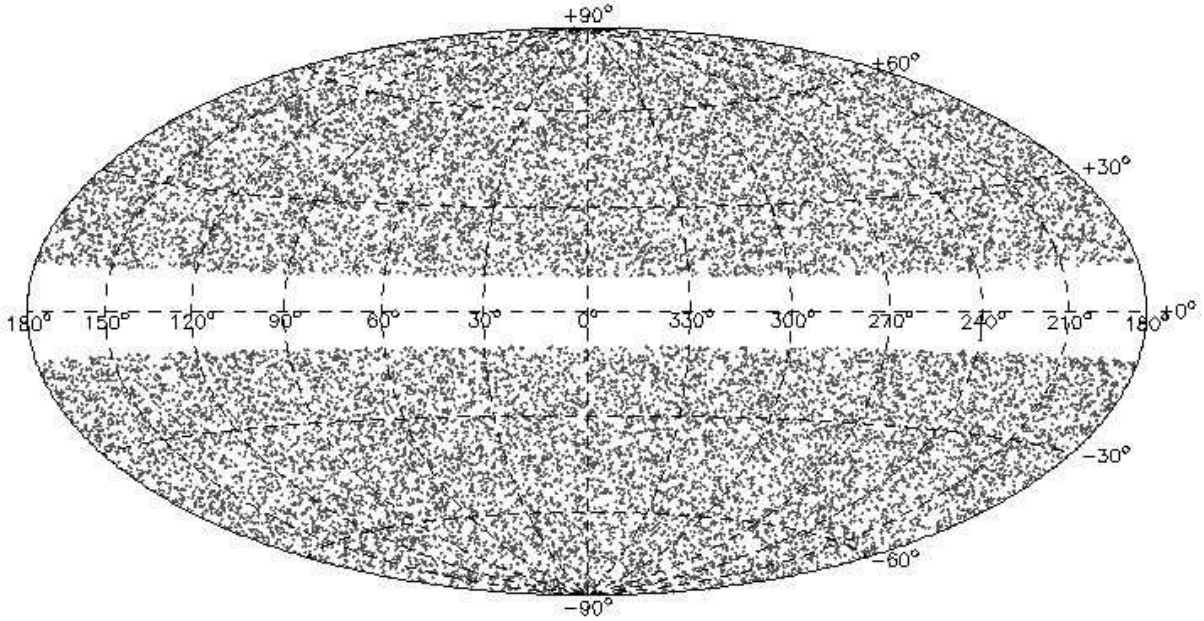
Predicted distribution of gamma-ray fluxes in
RASS-NVSS-SLOAN Blazar Sample



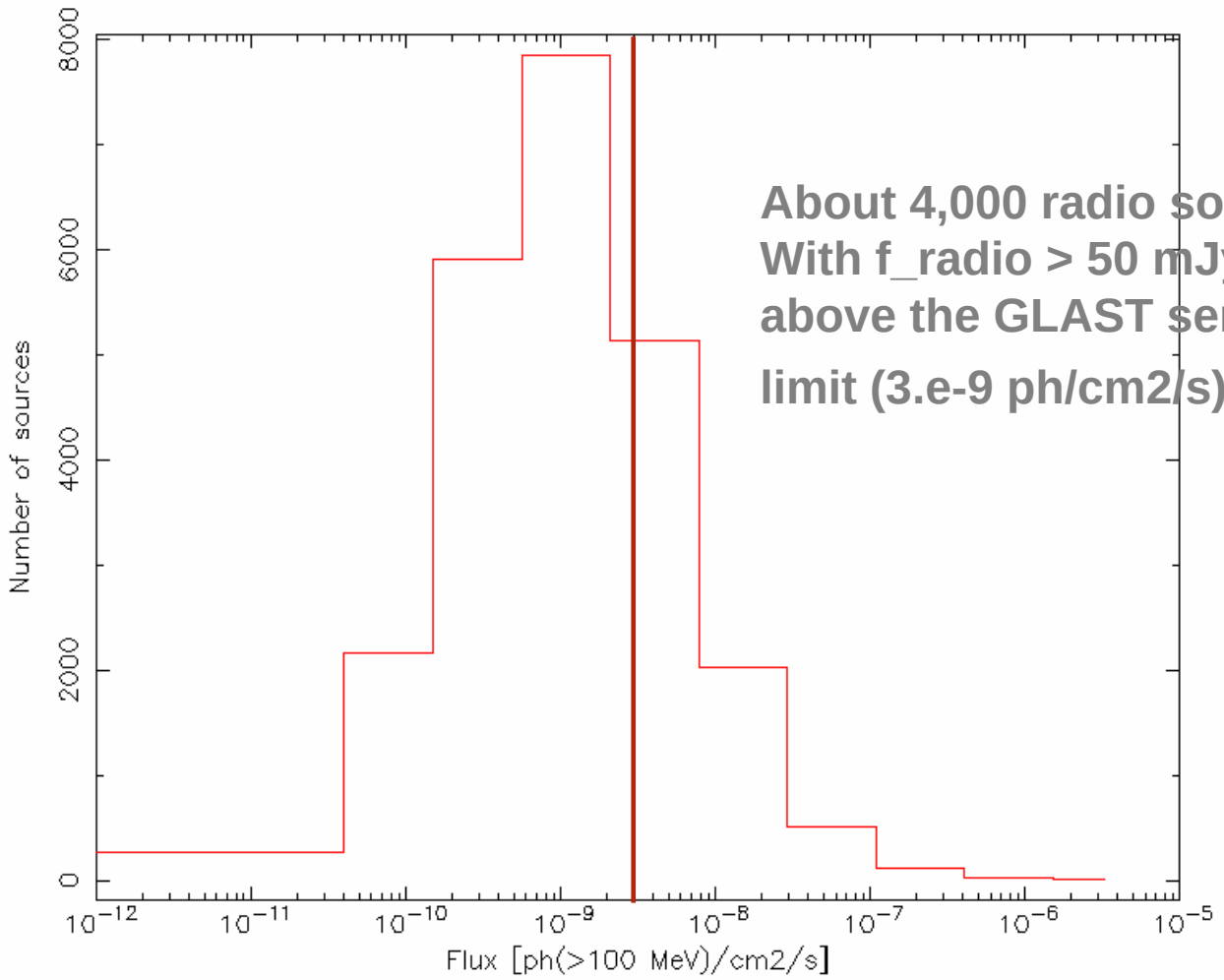
About 1000 RASS/NVSS sources above the GLAST sensitivity limit (3.e-9 ph/cm2/s)

A radio flux limited survey

(f_lim = 50 mJy, 24,000 blazars in 30,000 sq degrees of sky)

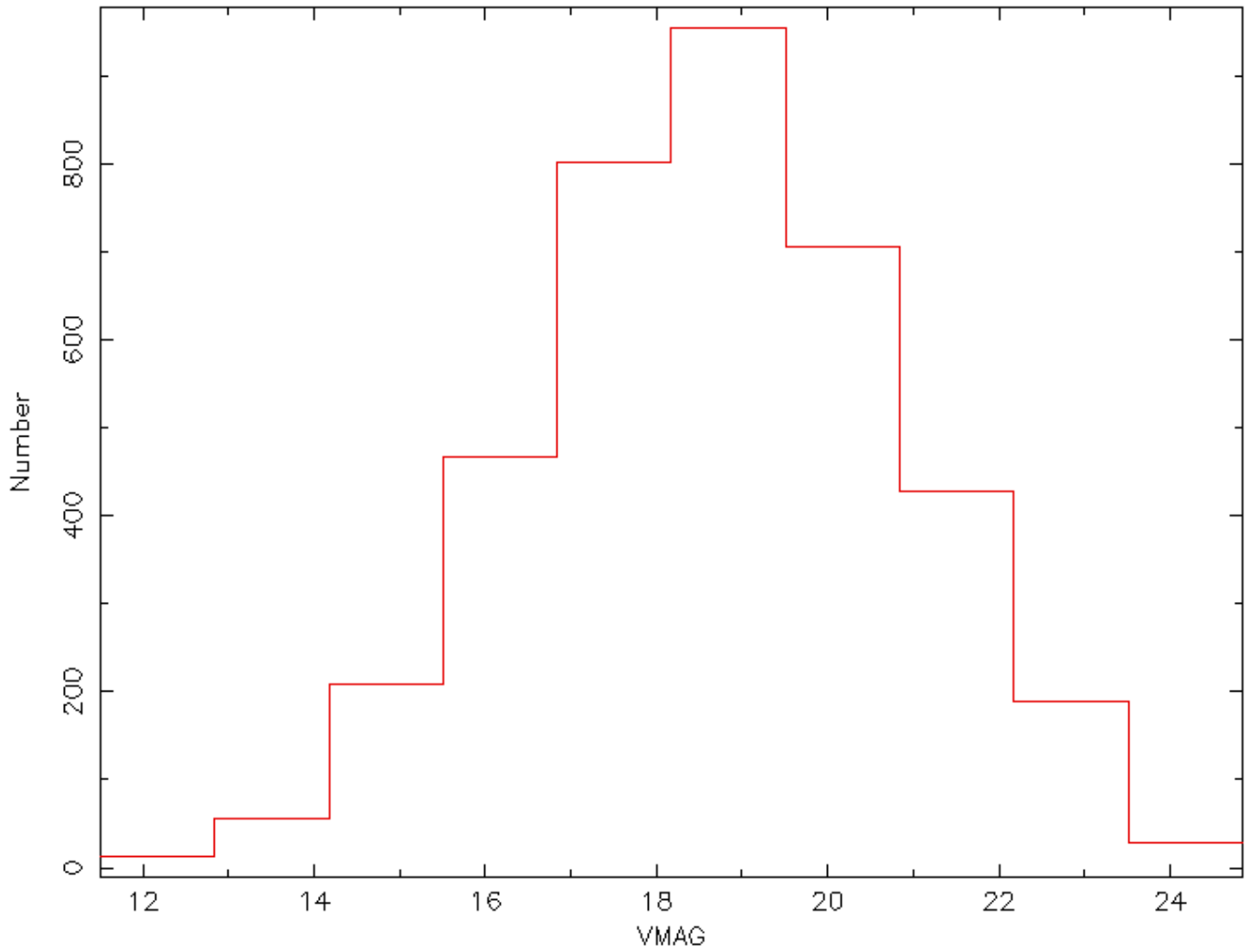


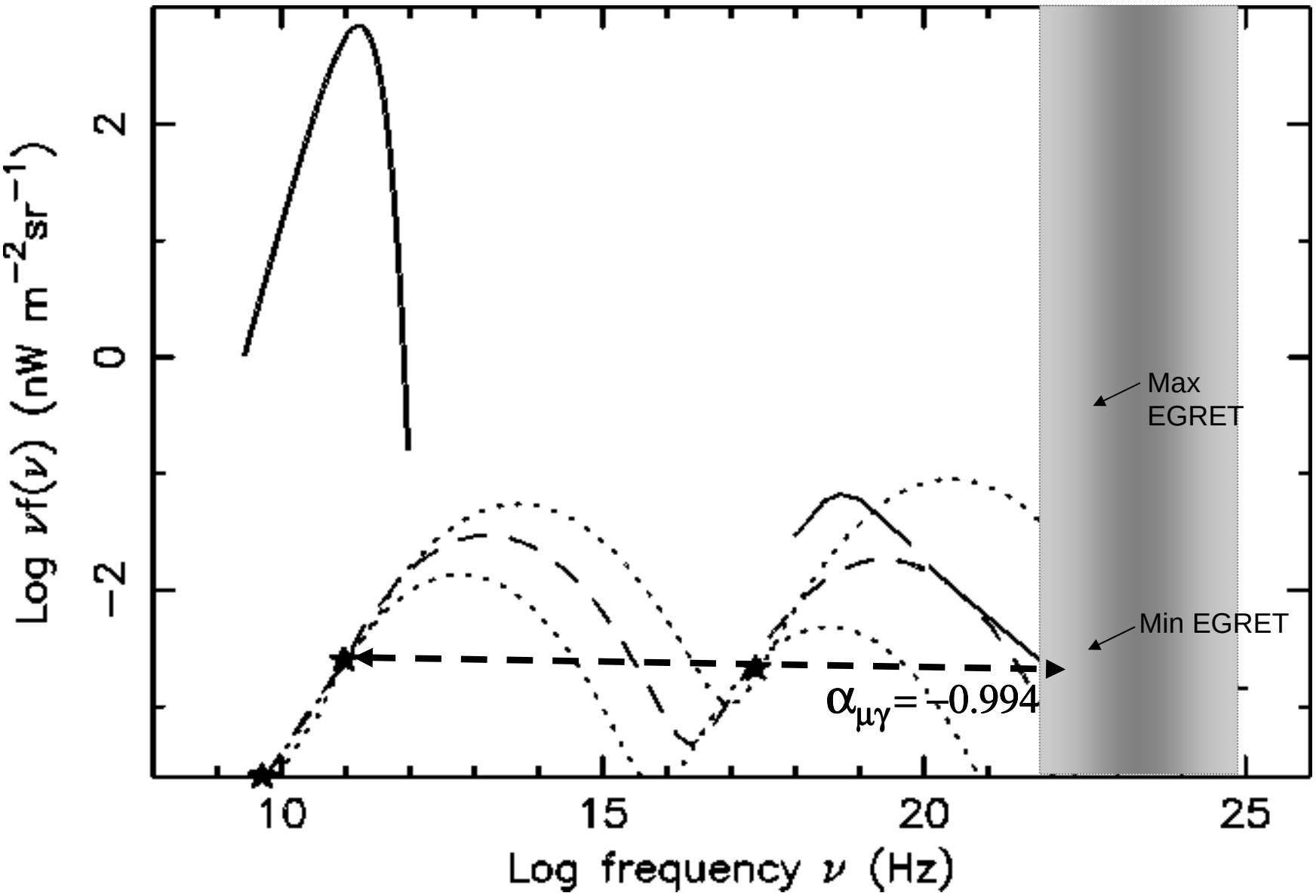
Predicted distribution of gamma-ray fluxes in a 50 mJy radio survey



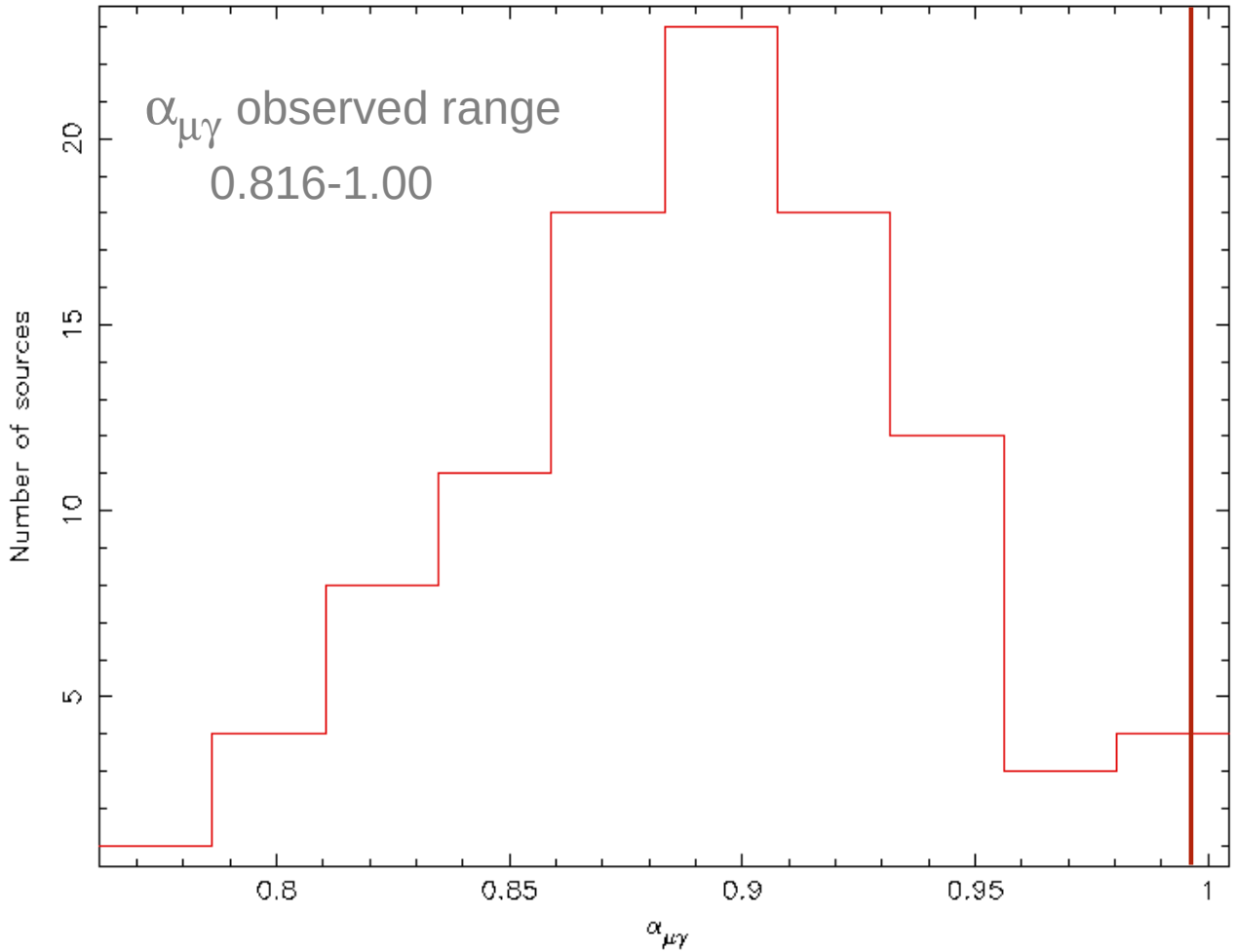
About 4,000 radio sources With f_radio > 50 mJy are above the GLAST sensitivity limit (3.e-9 ph/cm2/s)

Vmag distribution of detected sources

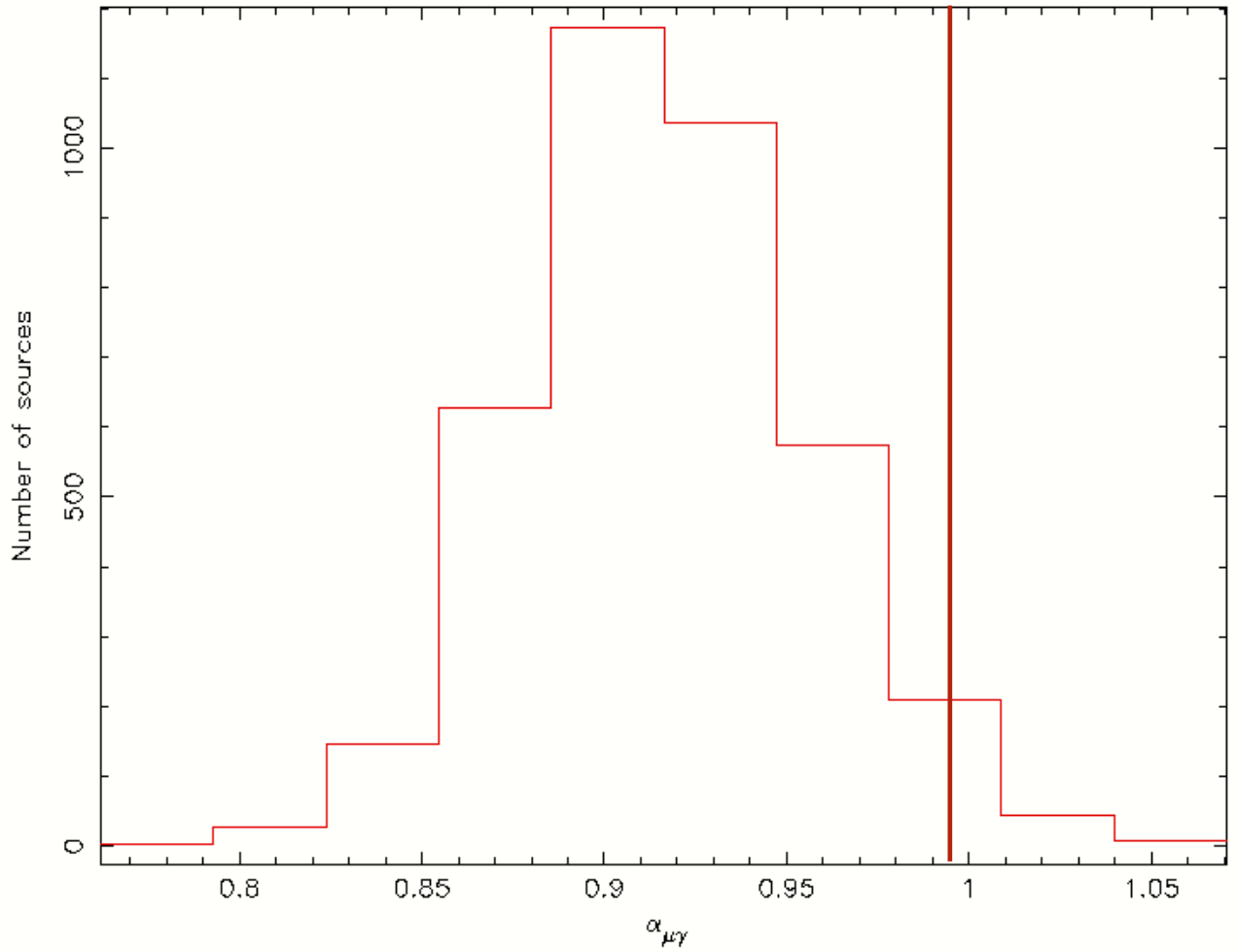



Log νf(ν) (nW m⁻²sr⁻¹)
2
0
−2
10
15
20
25
Log frequency ν (Hz)
Max
EGRET
Min EGRET
$\alpha_{\mu\gamma} = -0.994$

Expected distribution of microwave/gamma-ray spectral index ($\alpha_{\mu\gamma}$)
in the subsample of EGRET detected ($f_\gamma > 1 \times 10^{-7}$ ph/cm2/s > 100 MeV)
in the 50 mJy simulated radio survey (110 Blazars)



Expected distribution of microwave/gamma-ray spectral index ($\alpha_{\mu\gamma}$)
in the subsample of GLAST detected ($f_\gamma > 3\times10^{-9}$ ph/cm2/s > 100 MeV)
in the 50 mJy simulated radio survey



Preliminary conclusions

- GLAST should detect over 4000 Blazars
- About 1000 of these will be included in the RASS
- The arge majority of detected objects are seen during flares/high intensity states