GLAST IDS Report

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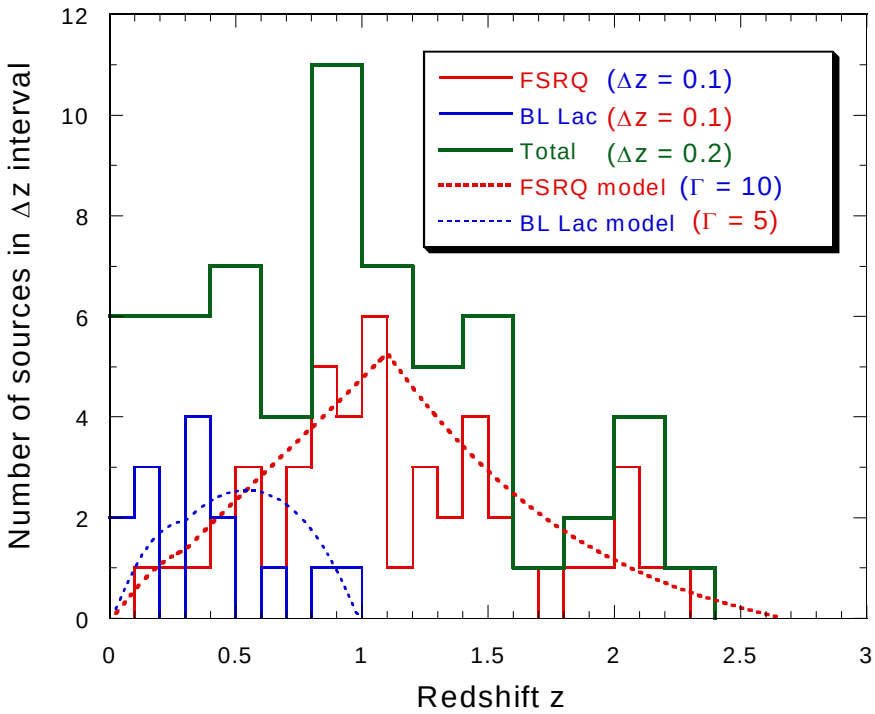
March 24, 2005

Descope issues

Searches for New Classes of Cosmological Sources



- New classes of cosmological γ-ray sources likely found near threshold (quasars for COS-B; BL Lac objects and clusters of galaxies for EGRET)

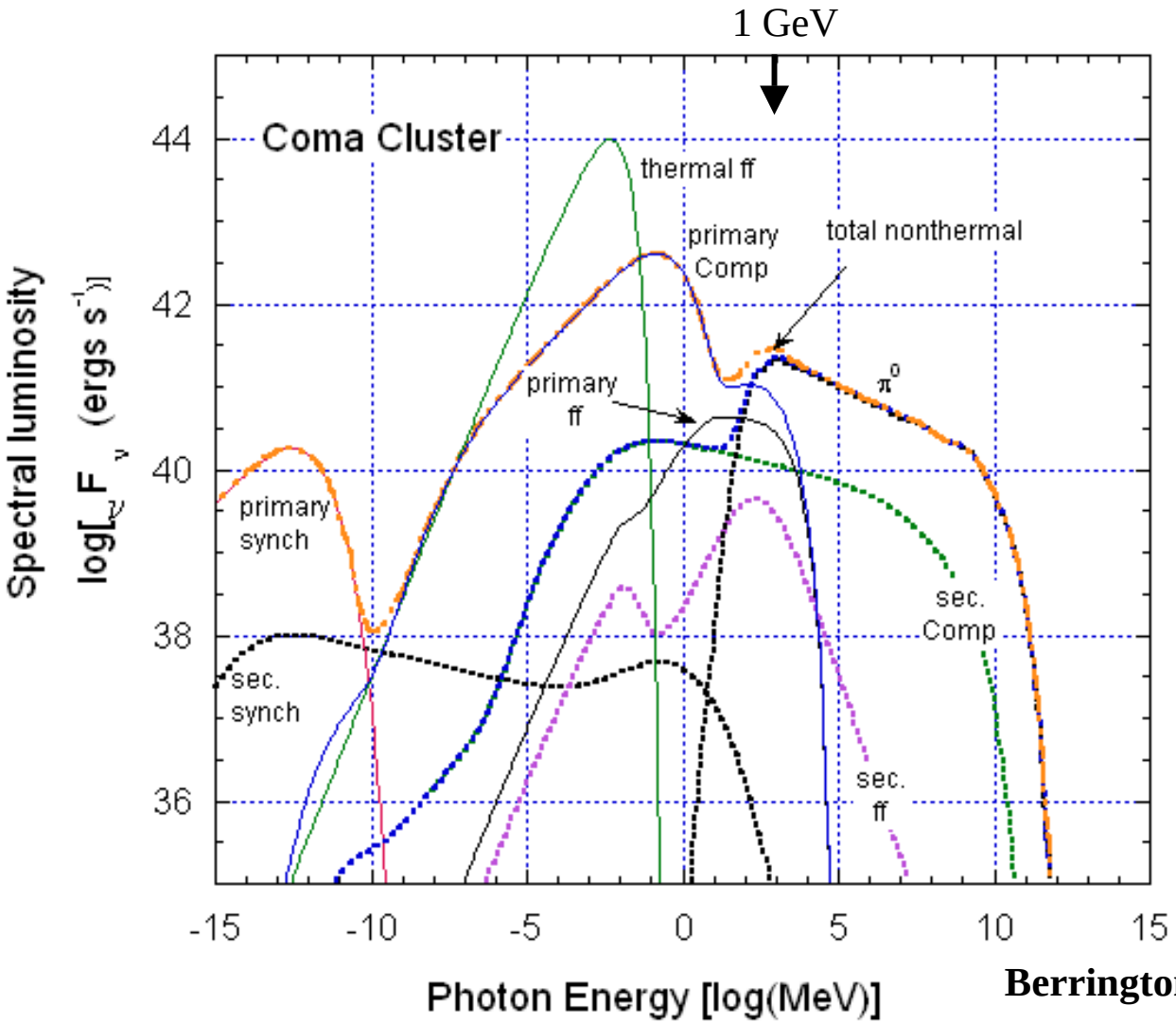
- Peak of activity of cosmological γ-ray sources (blazars, gamma-ray bursts) at redshift z ~ 1

- Population evolution is strongly non-Euclidean, so large number of sources near threshold for BL Lac objects and clusters of galaxies

- Descope can reduce number of detected cosmological sources in excess of loss of effective area

- Sources detected near threshold are crucial to study cosmological population evolution

Coma Cluster



EGRET

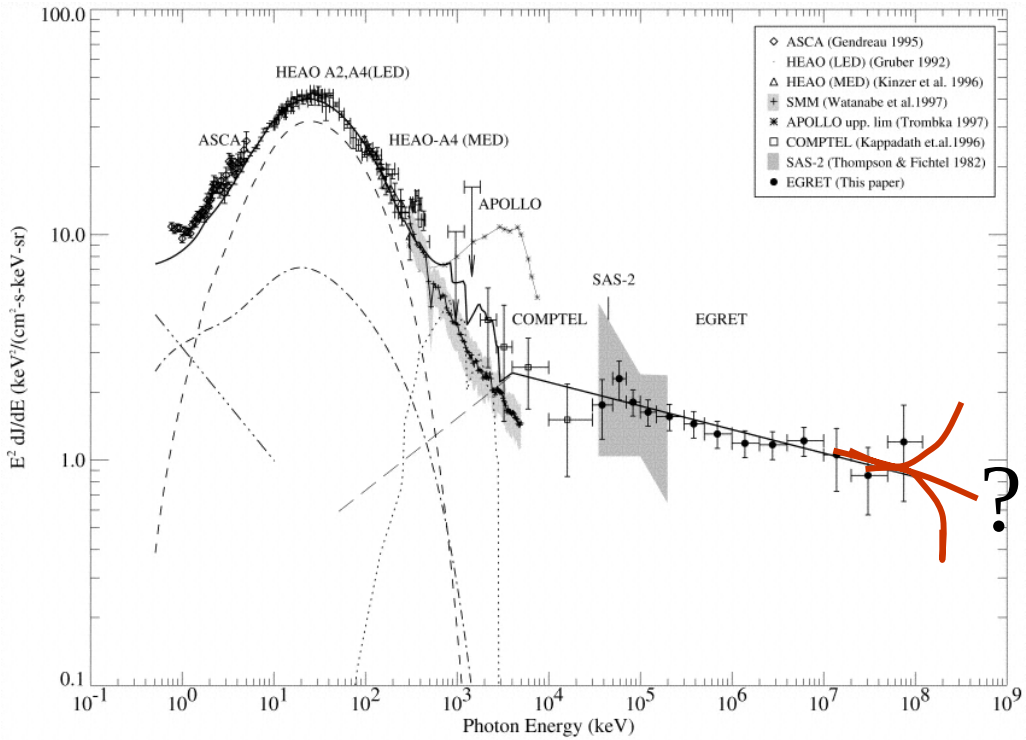
GLAST

Berrington & Dermer (2005)

Predict GLAST detection of Coma from hadronic processes

Nonthermal signature of structure formation

Decoding the γ-Ray Horizon

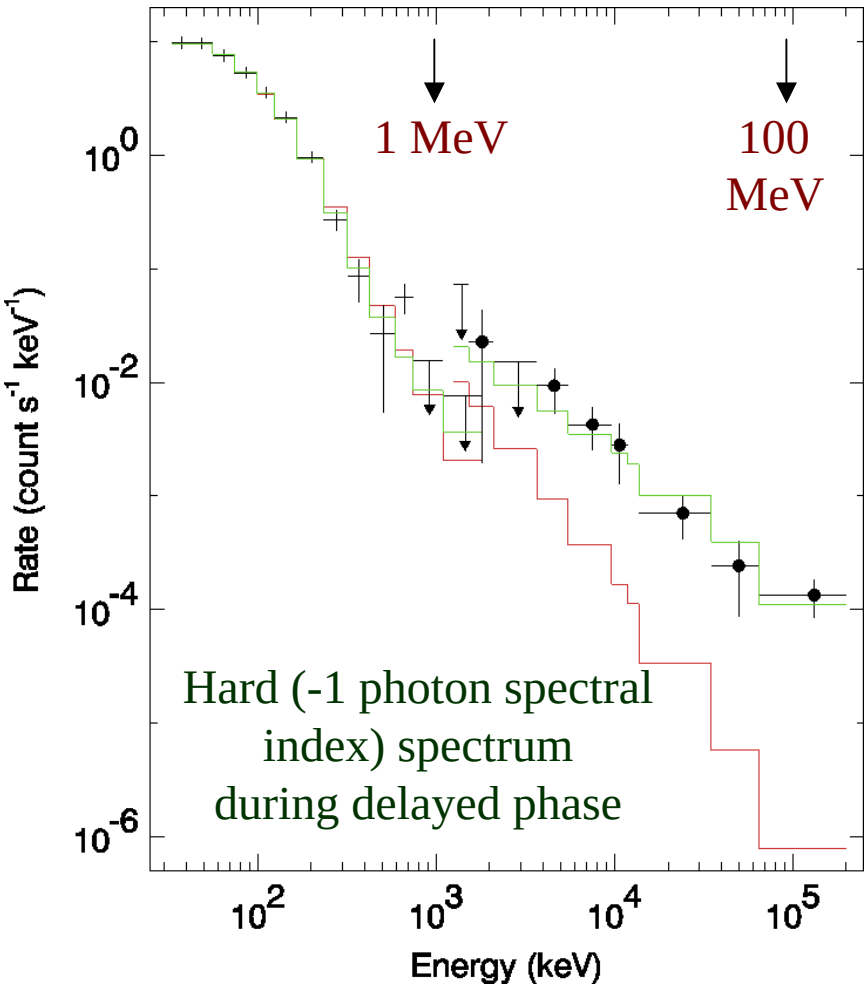


(Sreekumar et al. 1998)

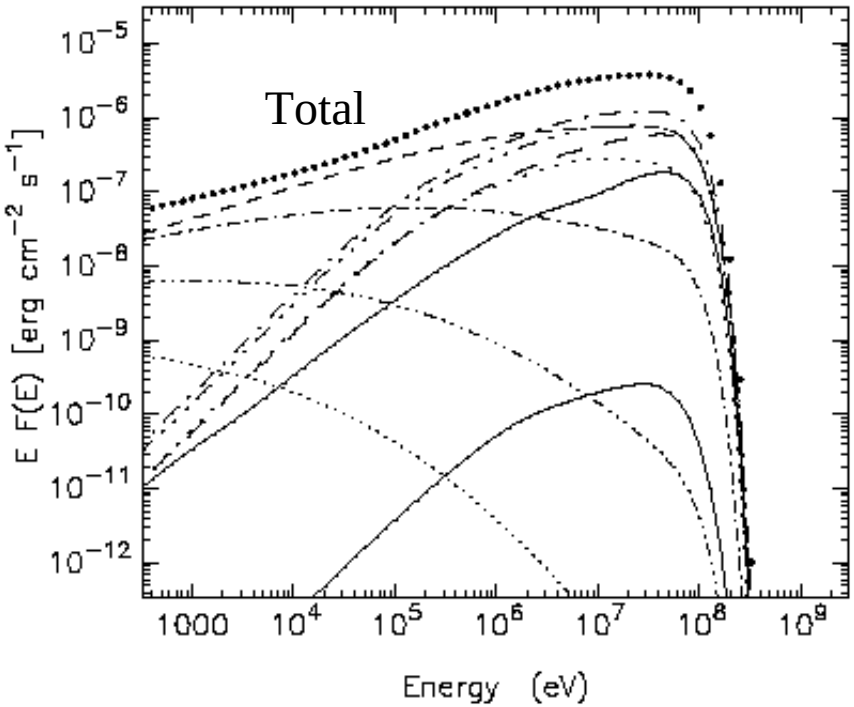
- High-energy diffuse background is a calorimeter of energetic activity in the early universe
- High-energy γ-rays cascade to 50 – 100 GeV energies, revealing intensity of the diffuse infrared background at high-redshifts and γ-ray sources
- Upturn in the diffuse high-energy γ-ray continuum predicted from γ-ray halos around galaxies

(Requires the large field-of-view of GLAST; difficult to do with ground-based air Cherenkov telescopes)

Hadronic Emission Components in GRBs and Blazars



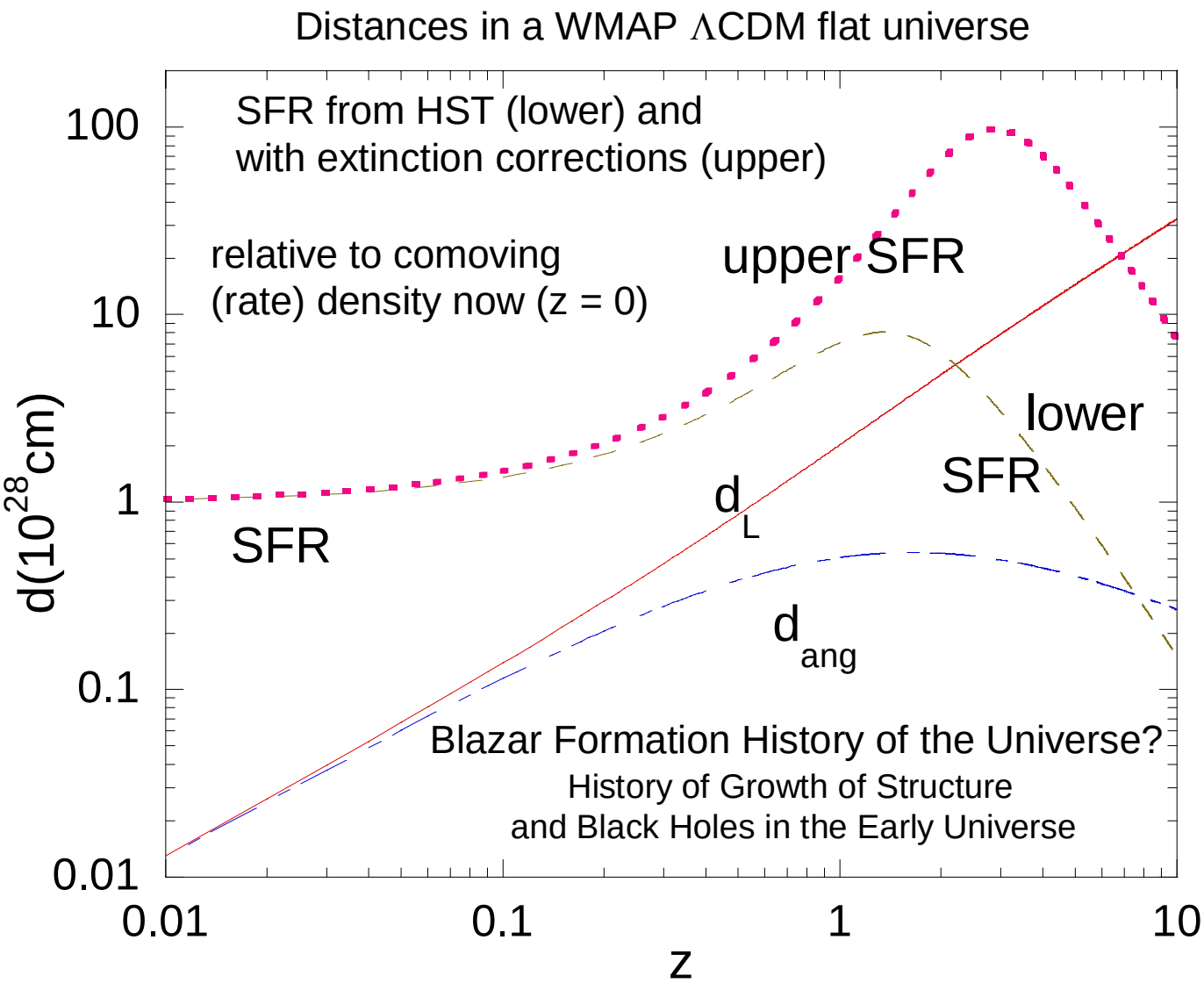
(Gonzalez et al. 2003)



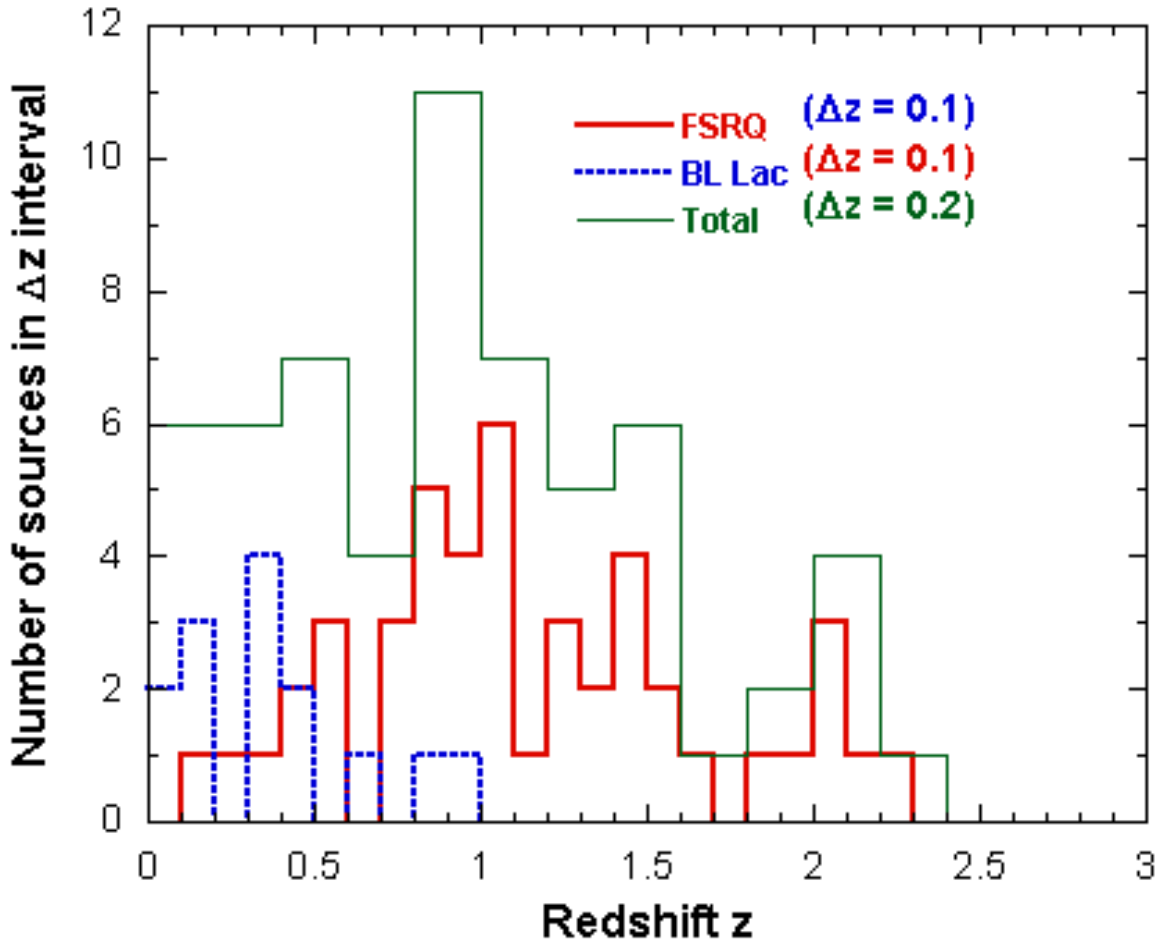
(Dermer and Atoyan 2004)

- Searches for hadronic γ-ray cascade components in GRBs and blazars requires good sensitivity near 100 MeV
- Crucial to solve the problem of cosmic-ray origin

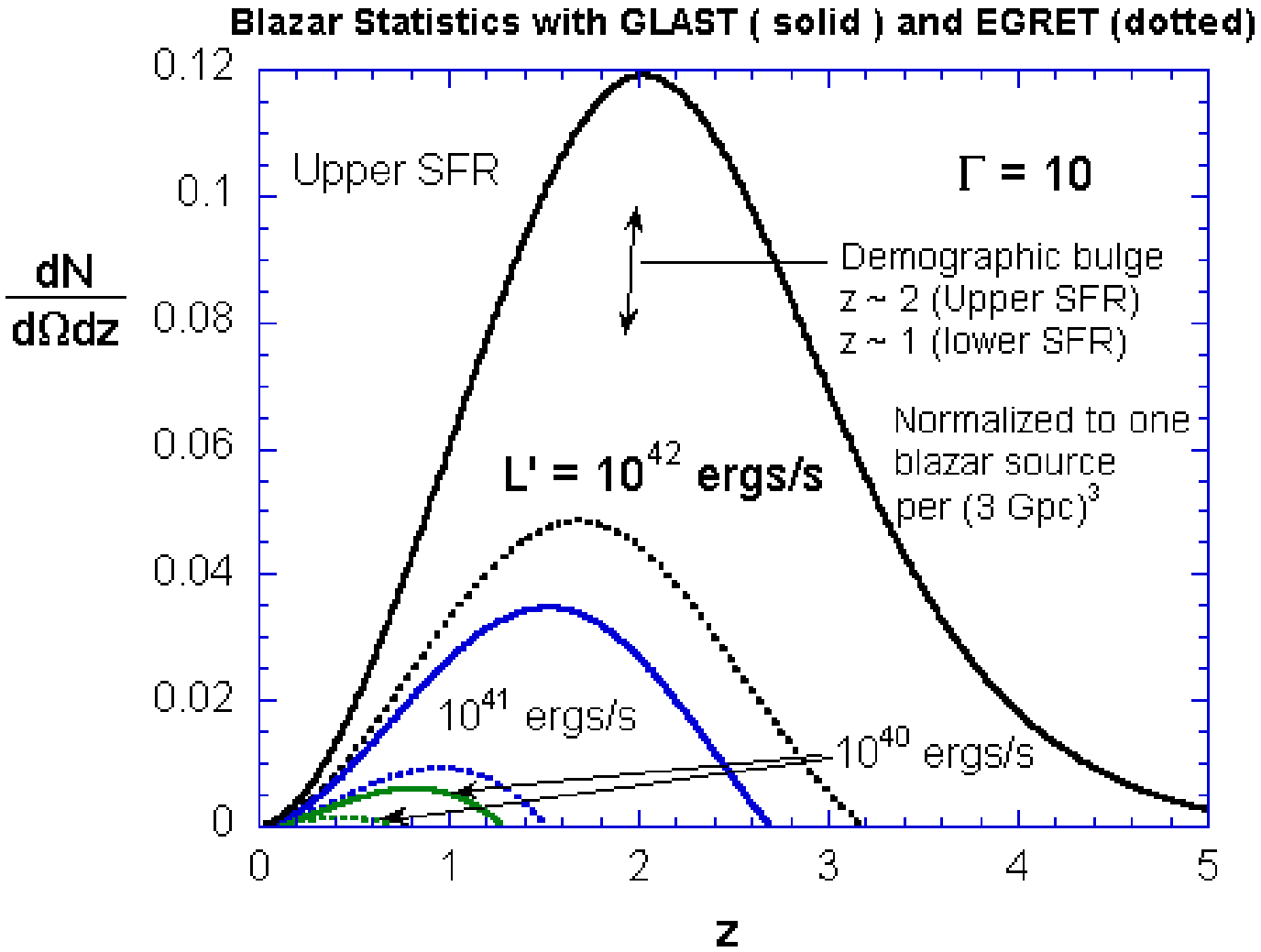
Gamma Ray Blazars and Black Hole History

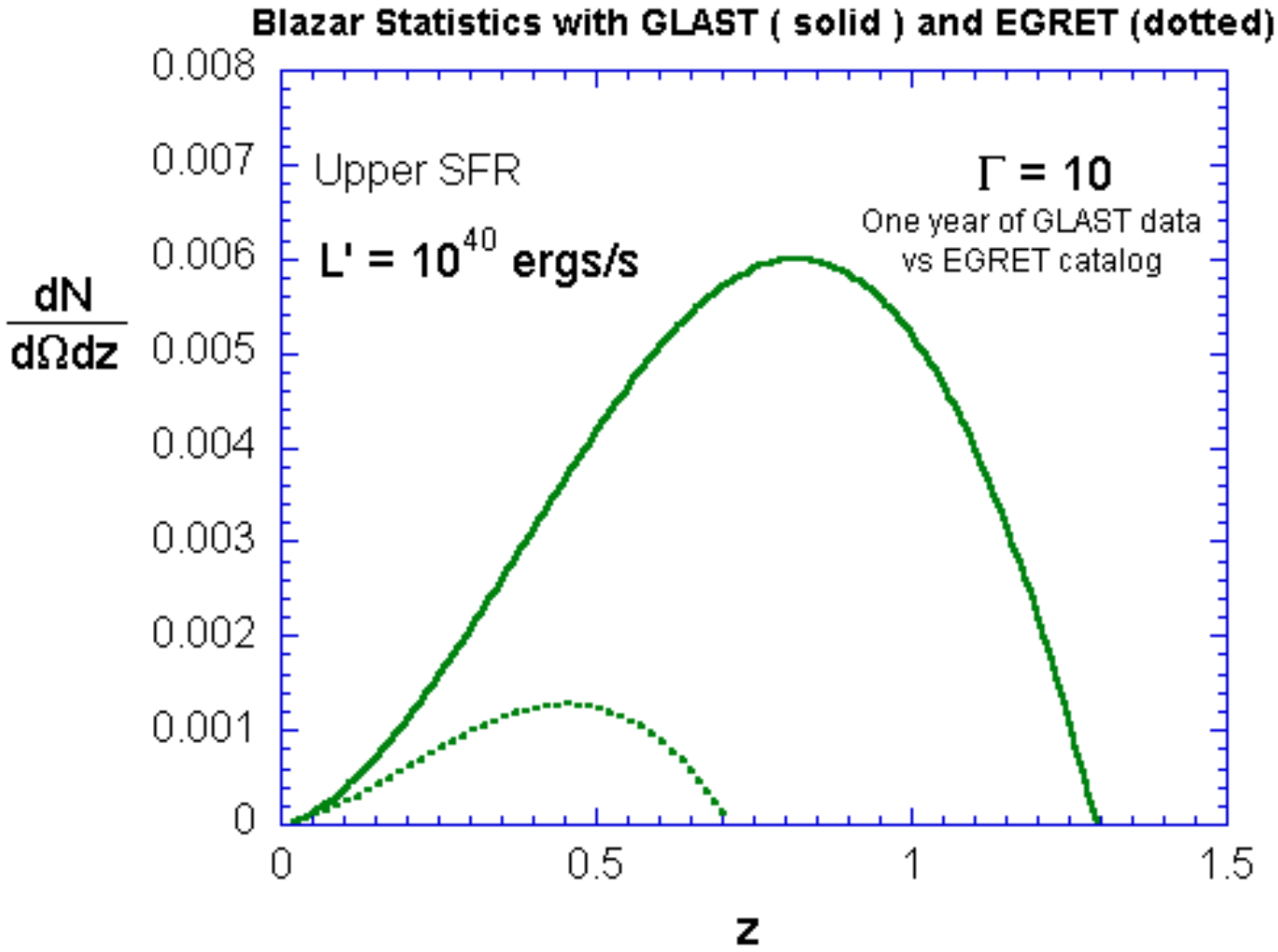


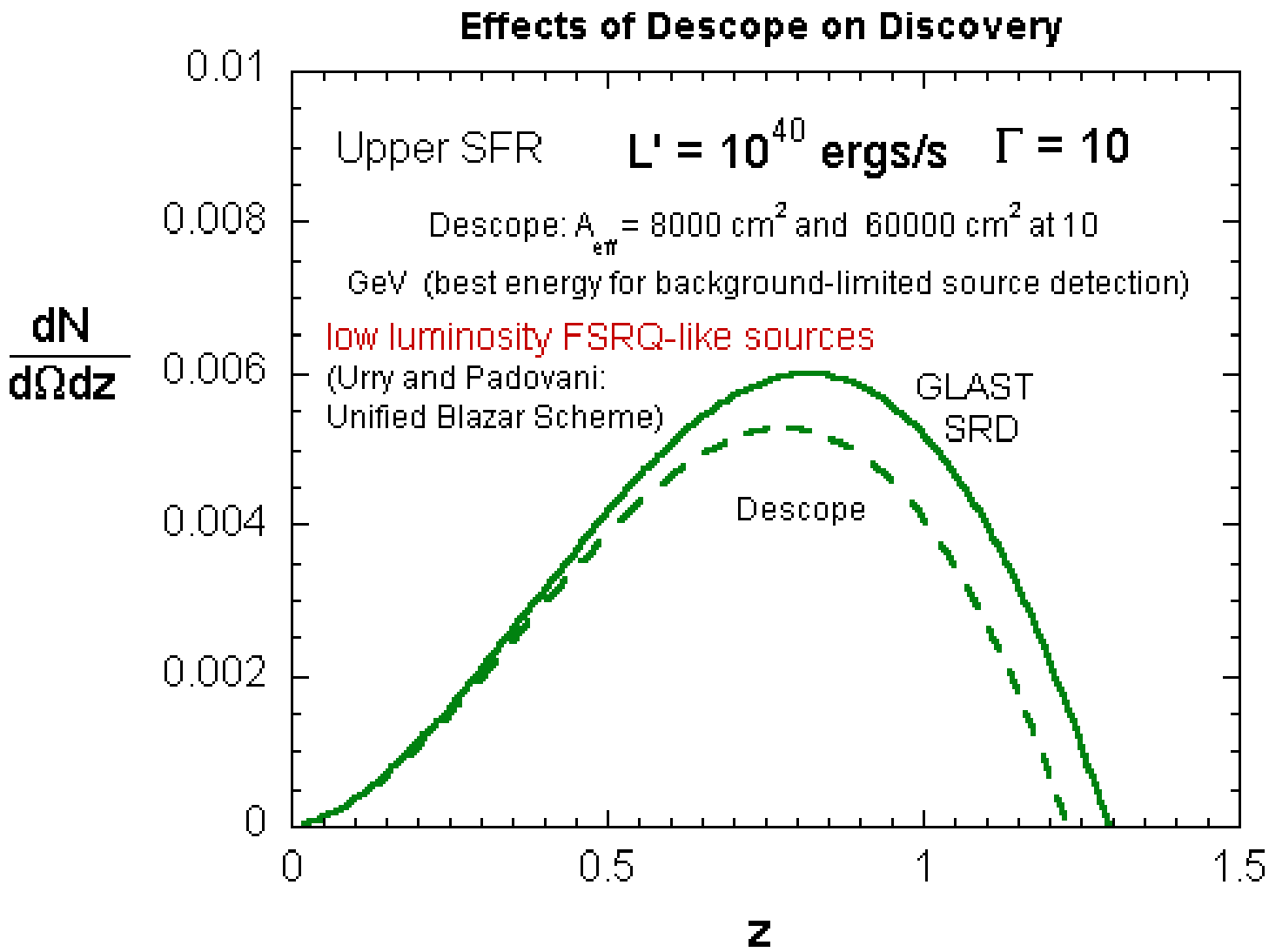
The EGRET Blazar Legacy

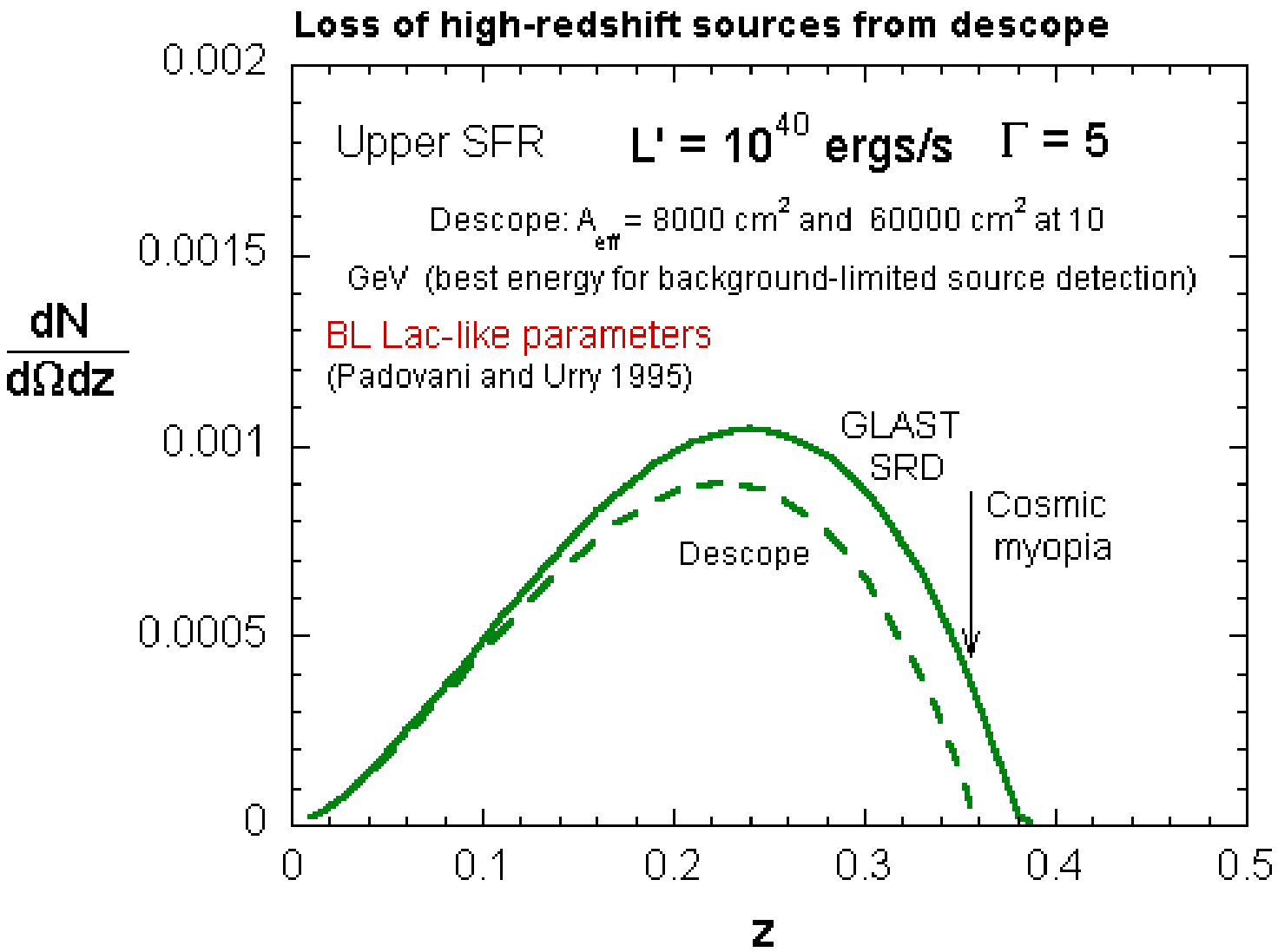


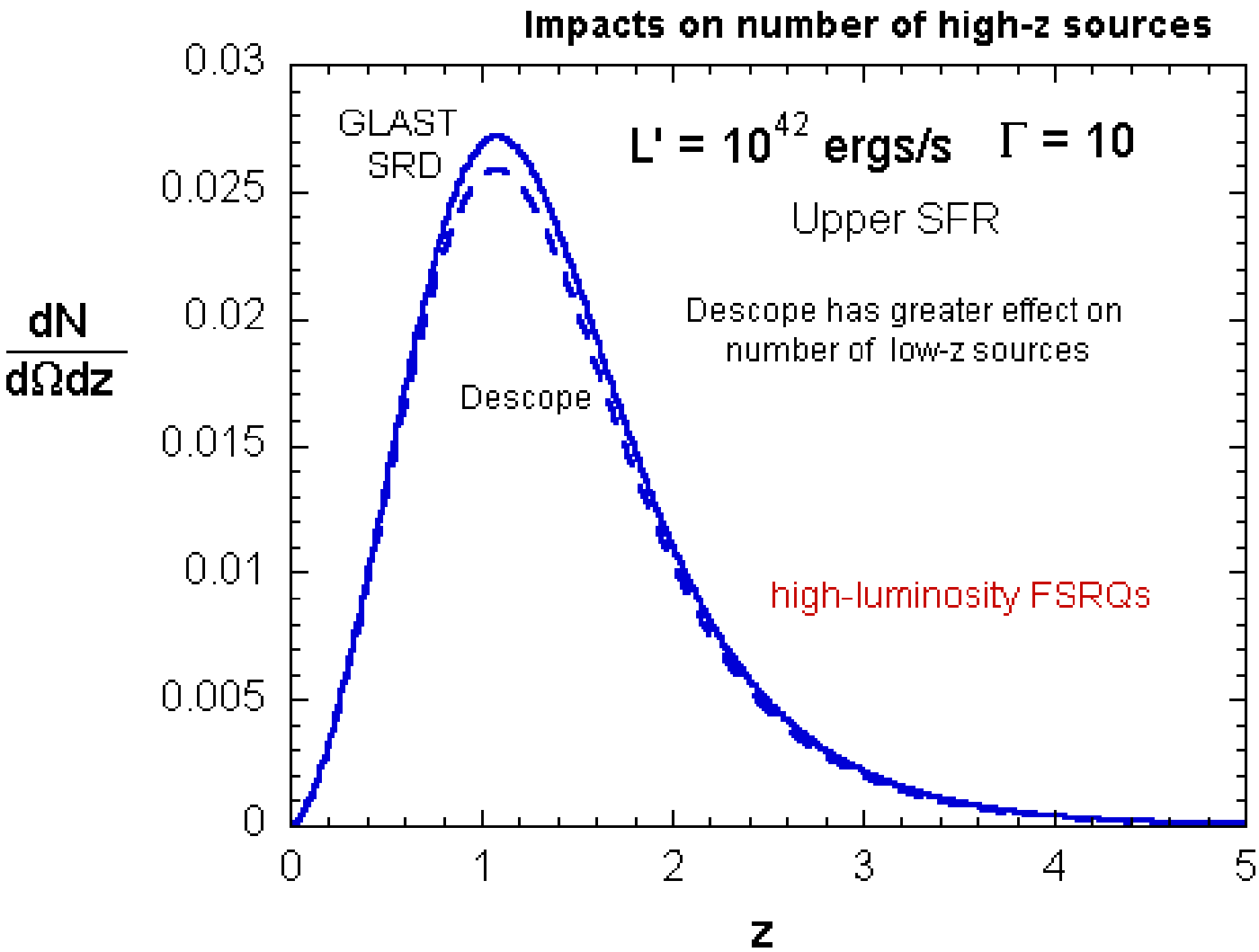
GLAST and EGRET




Blazar Statistics with GLAST (solid) and EGRET (dotted)
Upper SFR
L' = 10^40 ergs/s
Γ = 10
One year of GLAST data
vs EGRET catalog
dN/dΩdz
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
0
0.5
1
1.5
z


Effects of Descope on Discovery
Upper SFR
L' = 10^40 ergs/s
Γ = 10
Descope: A_eff = 8000 cm^2 and 60000 cm^2 at 10
GeV (best energy for background-limited source detection)
low luminosity FSRQ-like sources
(Urry and Padovani:
Unified Blazar Scheme)
GLAST
SRD
Descope
dN/dΩdz
z
0.01
0.008
0.006
0.004
0.002
0
0
0.5
1
1.5


Loss of high-redshift sources from descope
Upper SFR
L' = 10^40 ergs/s
Γ = 5
Descope: A_eff = 8000 cm^2 and 60000 cm^2 at 10
GeV (best energy for background-limited source detection)
BL Lac-like parameters
(Padovani and Urry 1995)
GLAST
SRD
Descope
Cosmic
myopia
dN
dΩdz
0.002
0.0015
0.001
0.0005
0
0
0.1
0.2
0.3
0.4
0.5
z


Impacts on number of high-z sources
GLAST
SRD
L' = 10^42 ergs/s Γ = 10
Upper SFR
Descope has greater effect on
number of low-z sources
Descope
high-luminosity FSRQs
dN
dΩdz
0.03
0.025
0.02
0.015
0.01
0.005
0
0
1
2
3
4
5
z

What I will be working on in the next ~yr:

Papers (Coma, microquasars, Amati relation, blazar statistics, black holes)

Support for Armen Atoyan

GRB γ-rays (Hadronic vs. Leptonic components; Constraints on colliding shells in terms of location, Γ factor from γ–γ attenuation, use for measurement of EBL) Talk at Palaiseau in April

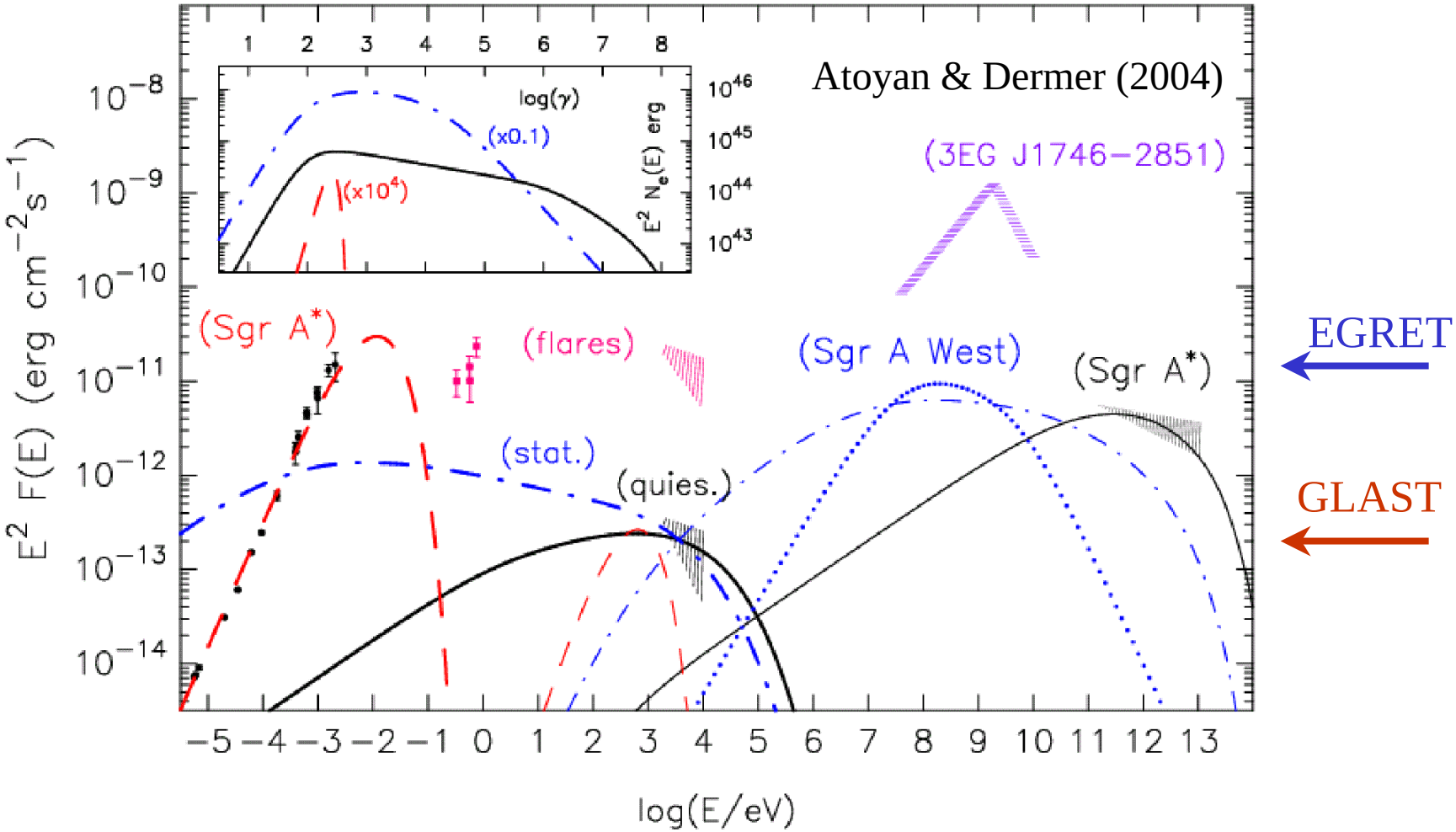
Organizing Committee for Unidentified Sources
multi-messenger astrophysics, Barcelona, July 2006
organizers: Josep Paredes, Olaf Reimer, Diego Torres

Summer Faculty sabbatical: Dr. Govind Menon (Troy State) BZ effect

γ rays, UHECRs and Neutrinos: 3 week workshop at KITP/Santa Barbara in May

Black-Hole Plerion (with Dr. Truong Le)

Galactic Center Black Hole Emission: Sgr A* ADAF + Black-Hole Plerion



Predict GLAST detection of quasi-stationary Compton and bremsstrahlung fluxes from pc-scale plerion. Predict nonvarying TeV emission.