

# The Mission Currently Known as "GLAST"

Arne Rau (Caltech)

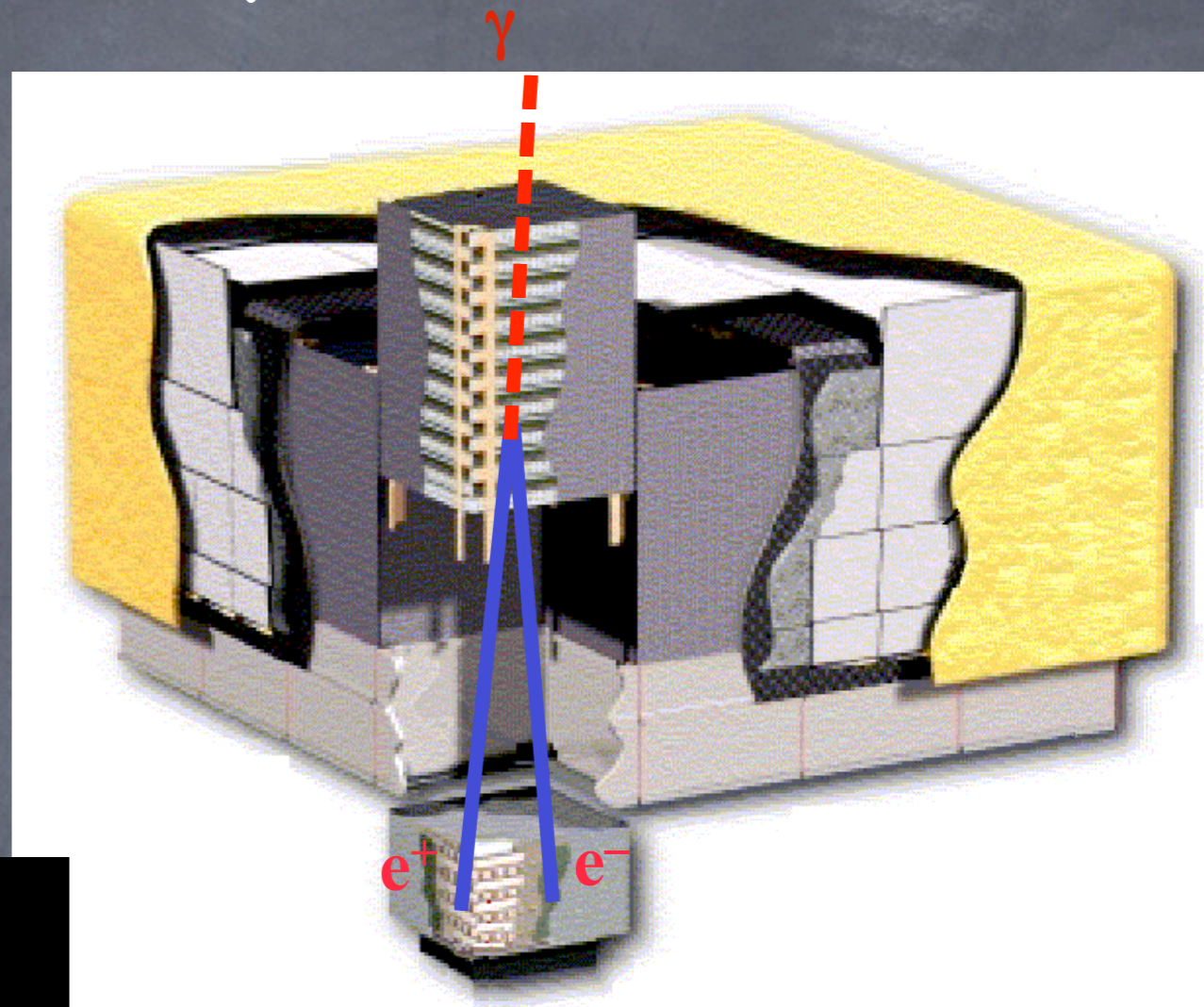
2008, June 11



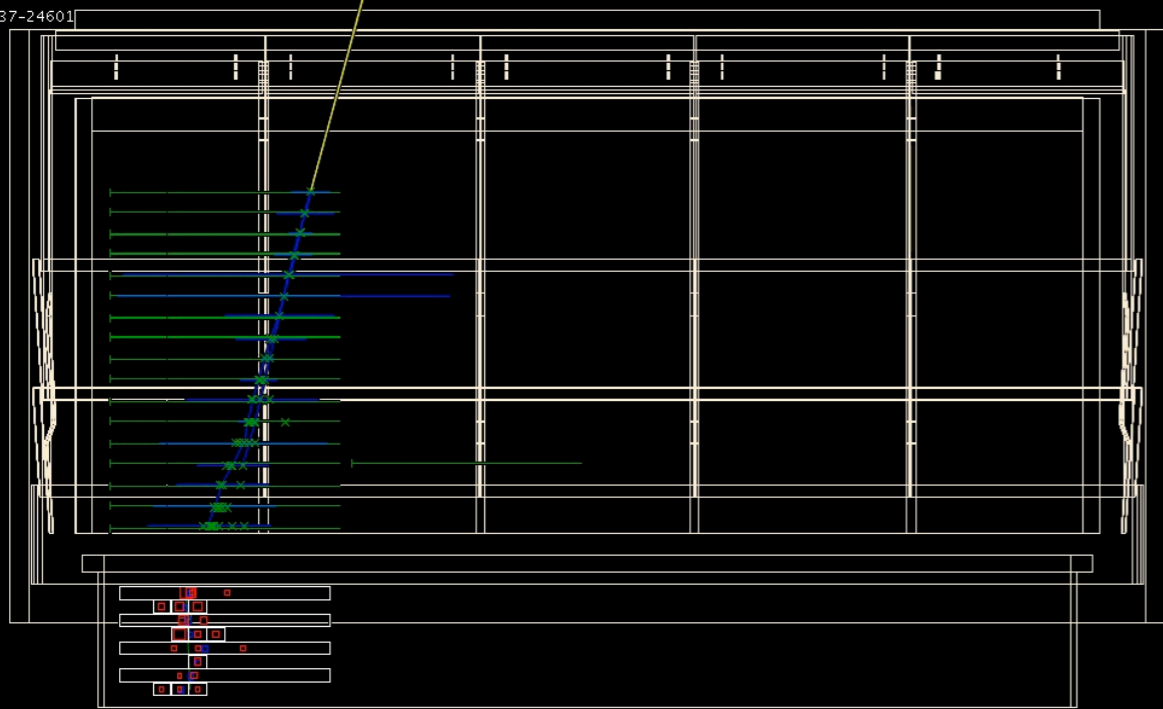
# Large Area Telescope (LAT)

## Detector:

- pair conversion telescope
- 4x4 detector modules
- trackers: 18 Si-strips + W foils
- calorimeters: 8x12 CsI crystals



ID: 236084237-24601



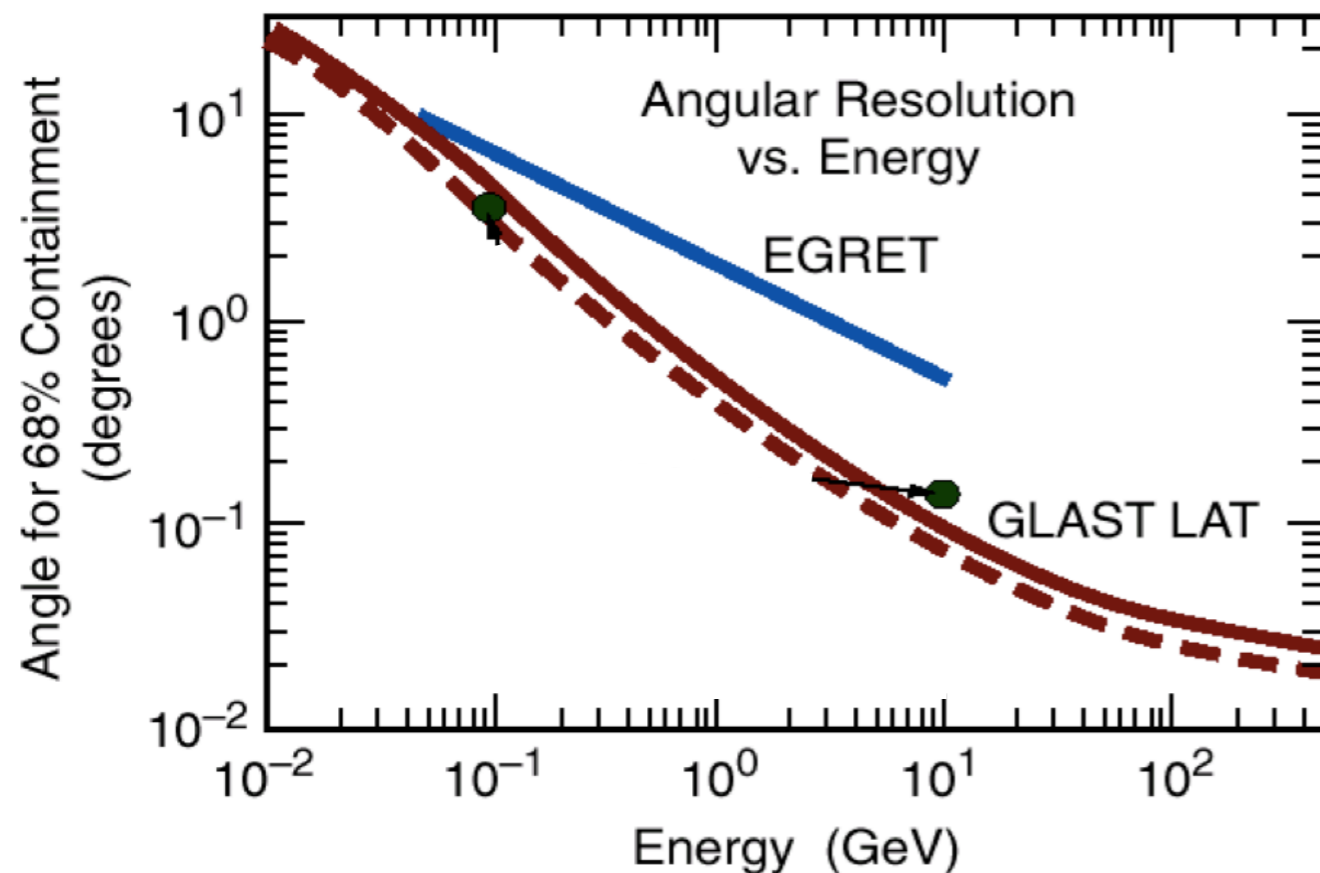
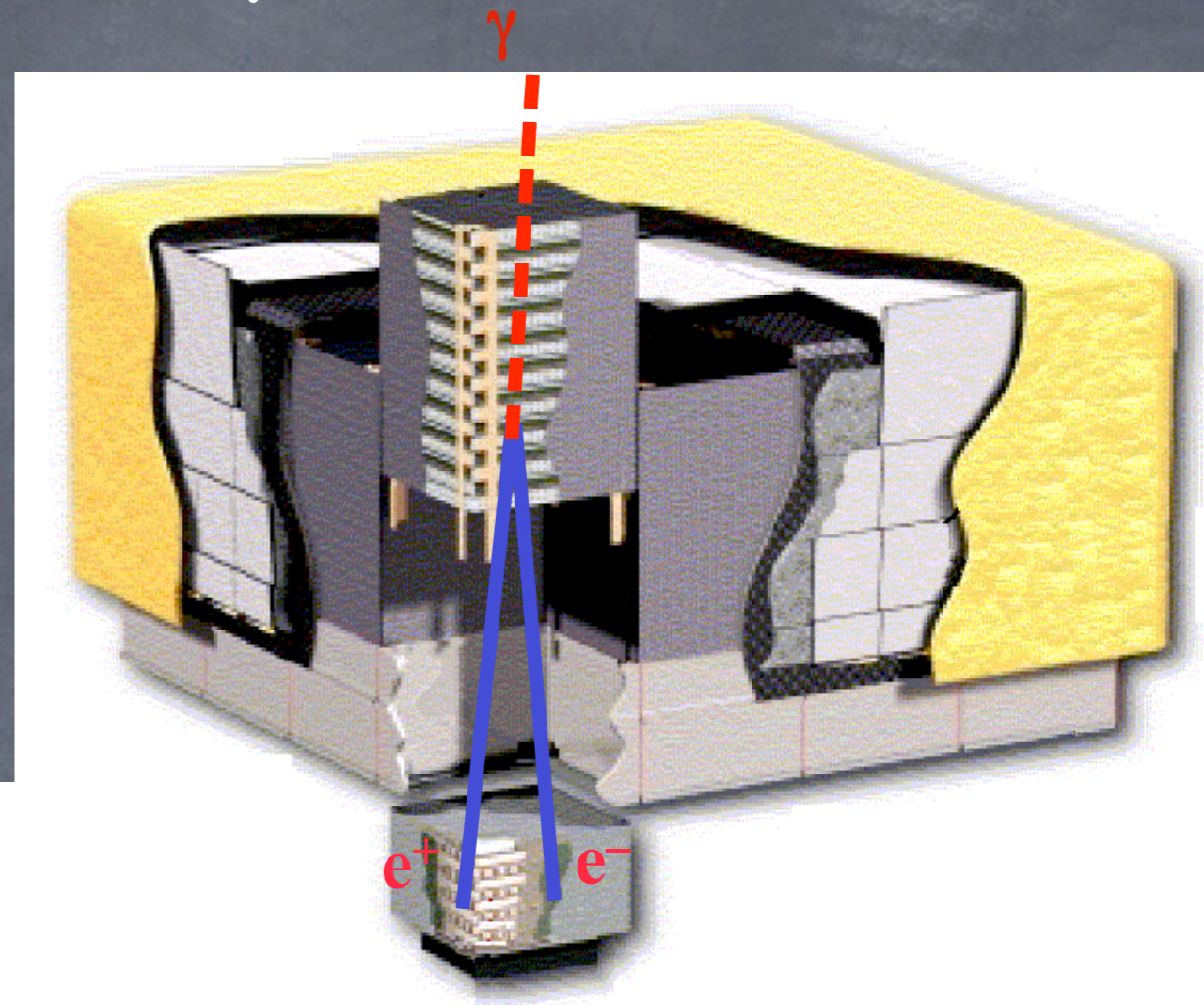
## Specs:

- E range: 20 MeV - 300 GeV
- field of view: 2.4 sr
- ang. resolution: 0.35 deg @ 1 GeV
- source location det.:  $< 0.5$  amin
- E resolution:  $< 10\%$  @  $E > 100$  MeV
- 1-yr sensitivity:  $4 \times 10^{-9} \text{ cm}^{-2} \text{ s}^{-1}$  ( $E > 100$  MeV)

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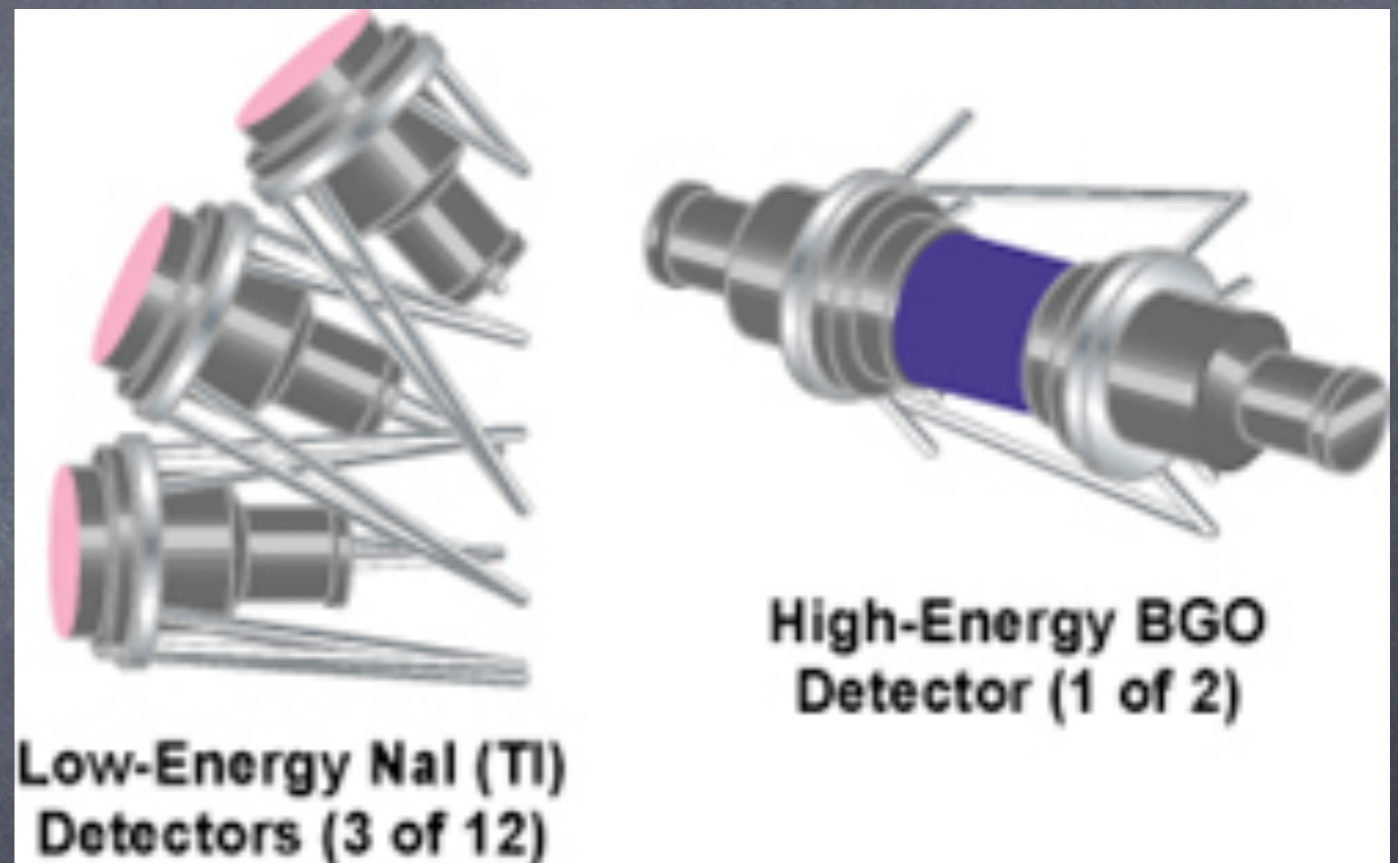
# GLAST Burst Monitor (GBM)

## Detectors:

- 12 NaI scintillators (8 keV - 1 MeV)
- 2 BGO scintillators (150 keV - 30 MeV)

## Specs:

- field of view:  $> 8$  sr
- source location det.:  $\sim 15$  deg
- E resolution:  $< 10\%$  @ 0.1 - 1 MeV
- burst sensitivity:  $0.5 \text{ cm}^{-2} \text{ s}^{-1}$   
(E = 50 - 300 keV)



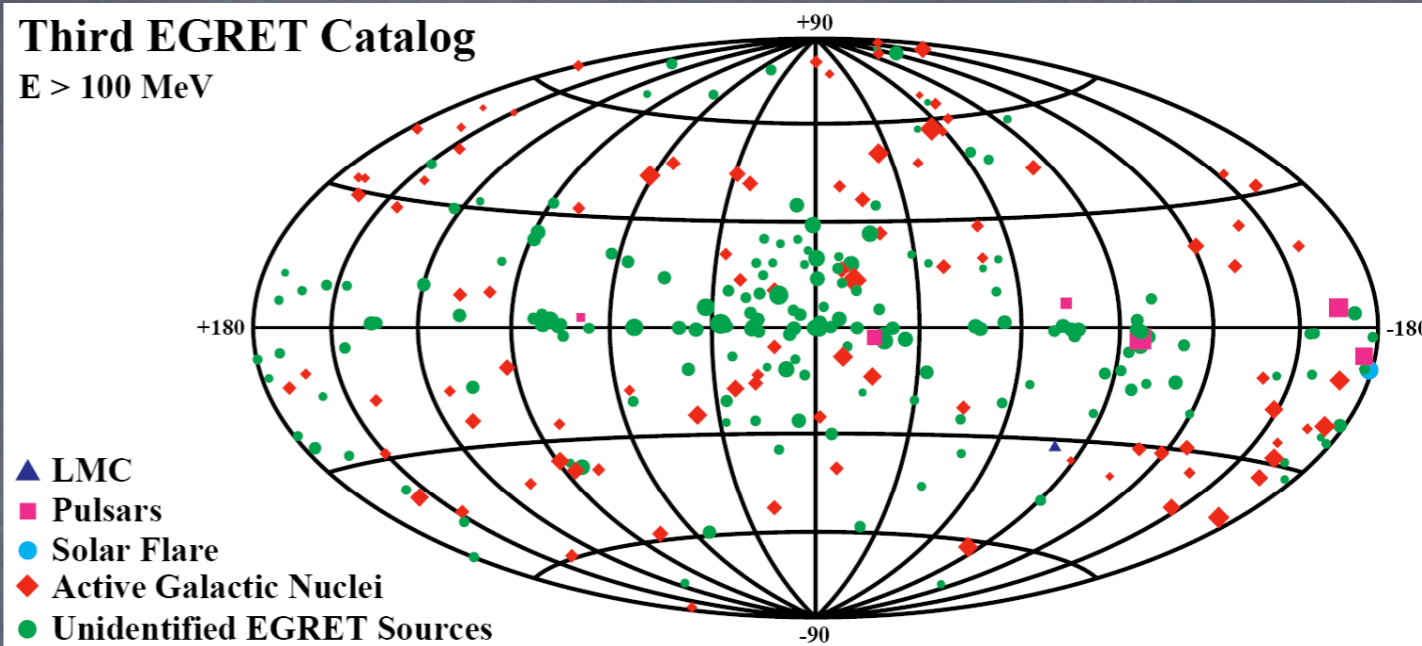
# Operation and Goals

## Mission Plan:

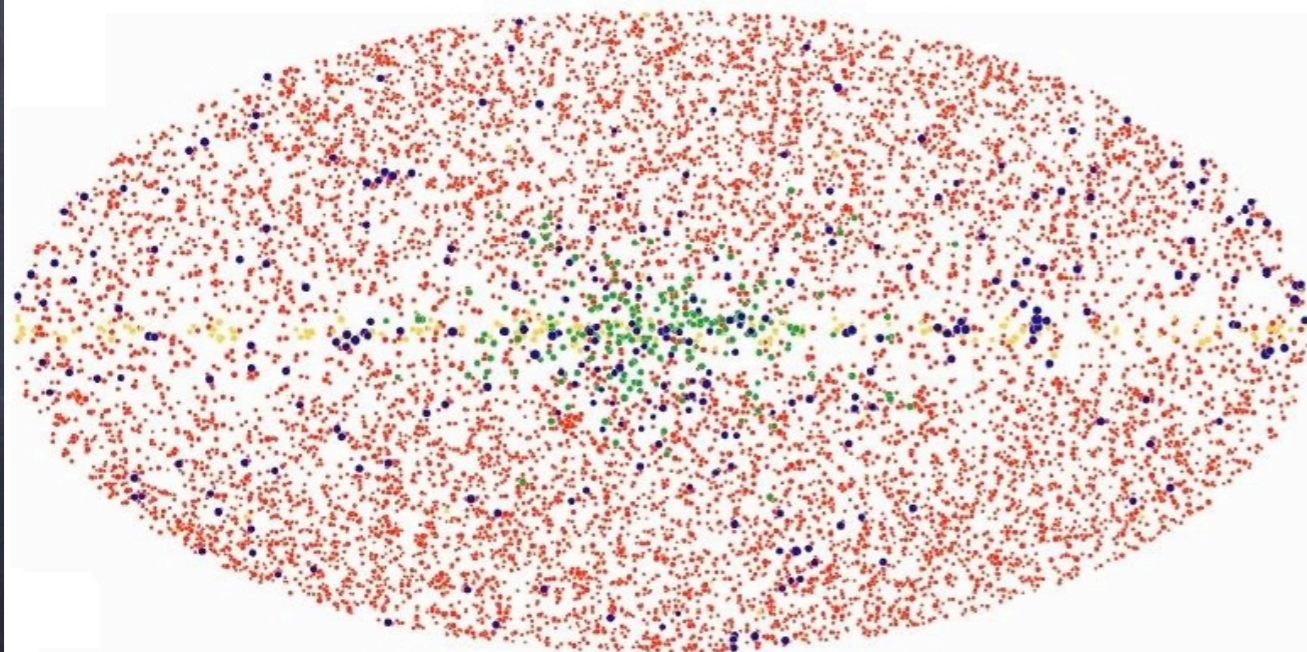
- 5 (+5) years duration
- 90 min orbit
- all-sky survey (nominal operation)
- each spot every 3 hrs
- "One EGRET every day"

## Third EGRET Catalog

$E > 100$  MeV



## $5\sigma$ Sources from Simulated One Year All-sky Survey



Results of one-year all-sky survey.  
(Total: 9900 sources)

- AGN
- 3EG Catalog
- Galactic Halo
- Galactic Plane

## (some) Aims:

- AGN
- GRBs
- pulsars
- origin of cosmic rays
- identify the unidentified
- known and unknown unknowns
- counterparts for TeV sources

# Blazar Sequence (?)

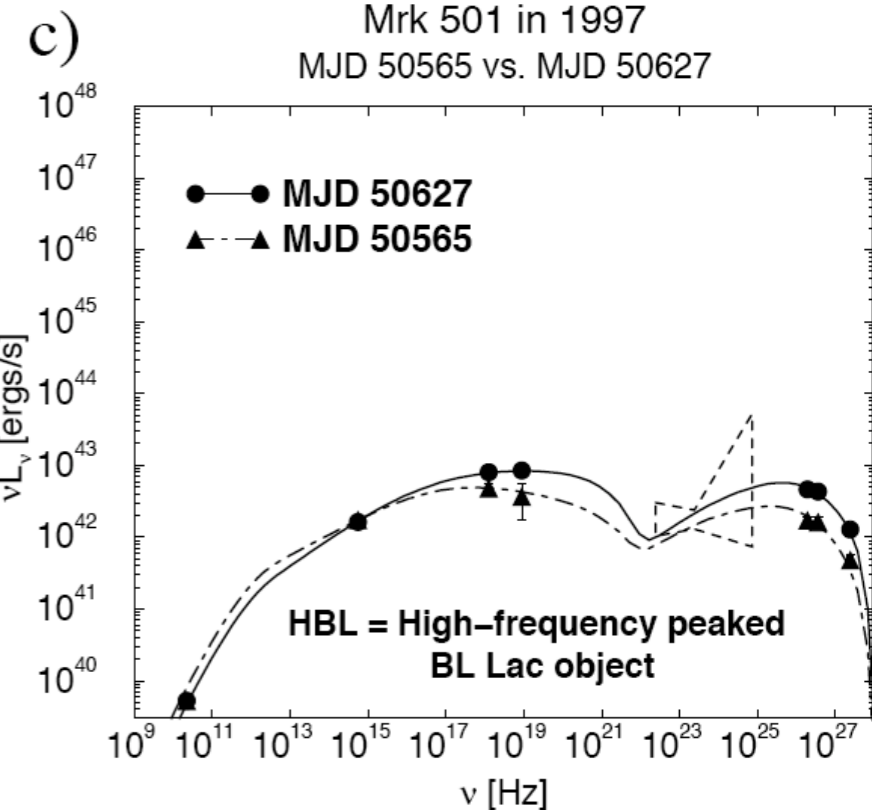
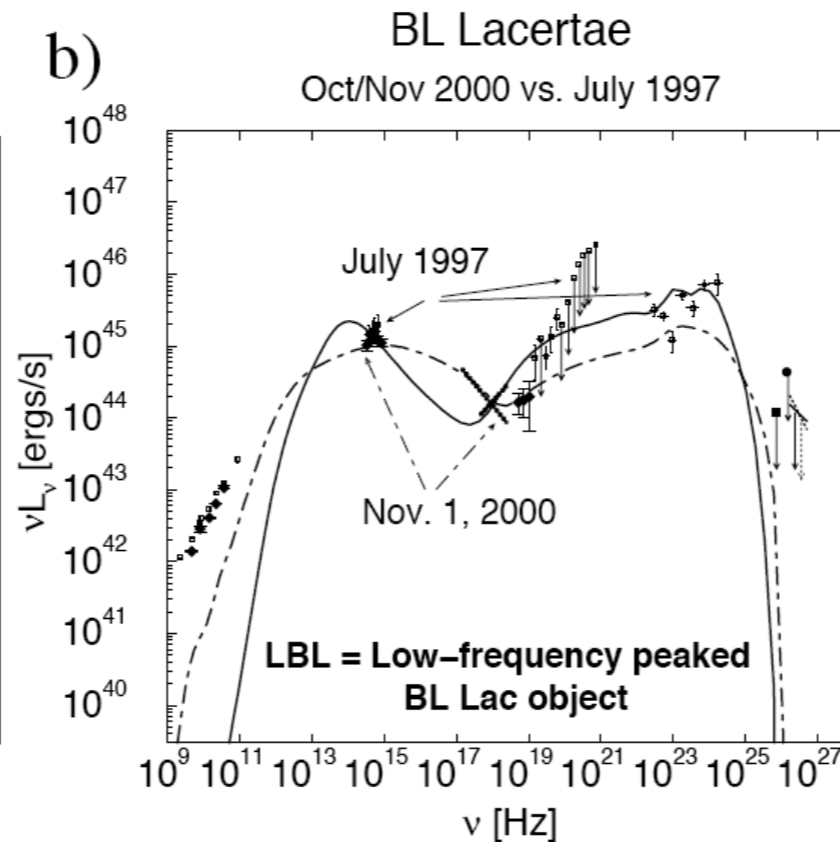
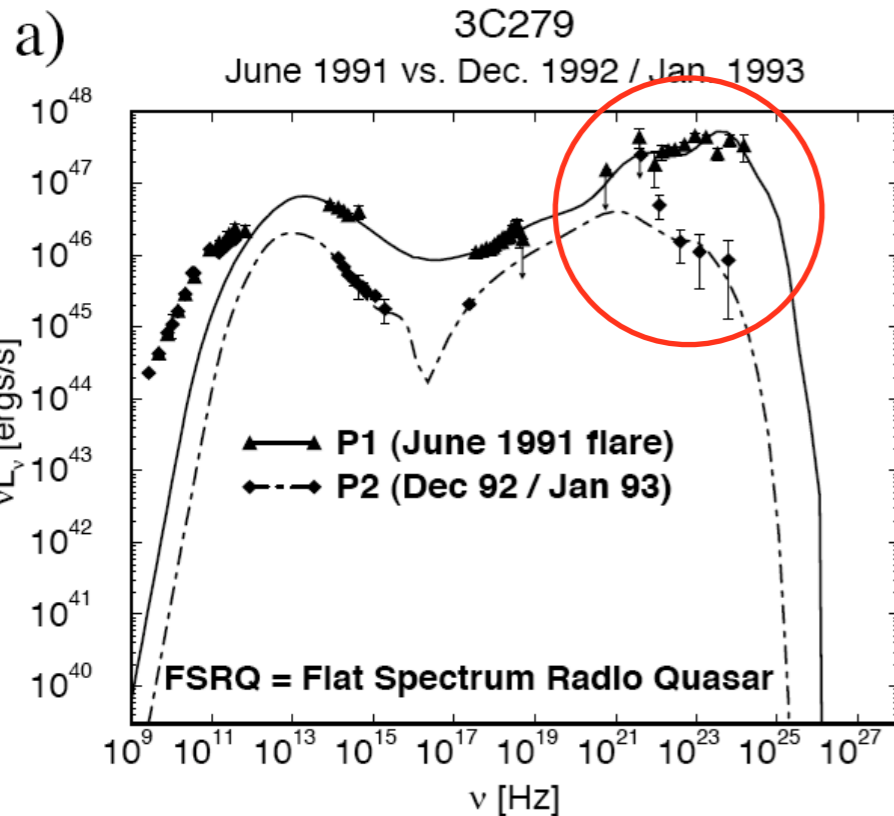
# Blazar Sequence (?)

## FSRQ:

- 👁 high luminosity
- 👁 redder SED
- 👁 quasar-like optical spectrum
- 👁 massive BH,  $\dot{m}$   $\sim 1$  ?
- 👁 early, violent, phase of galaxy evolution

## LBL - HBL:

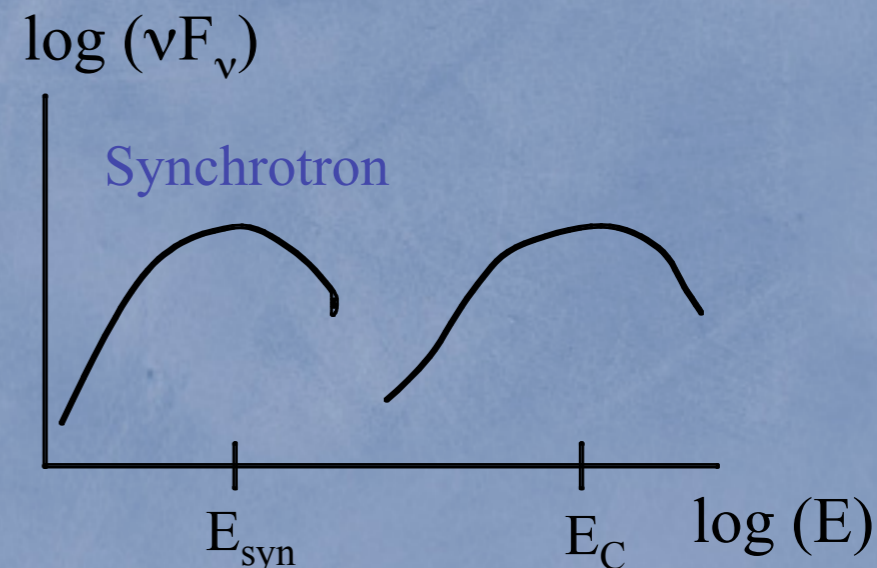
- 👁 low luminosity
- 👁 bluer SED
- 👁 featureless optical spectrum
- 👁 less massive BH,  $\dot{m}$   $\sim 10^{-2...-3}$  ?
- 👁 late phase of galaxy evolution



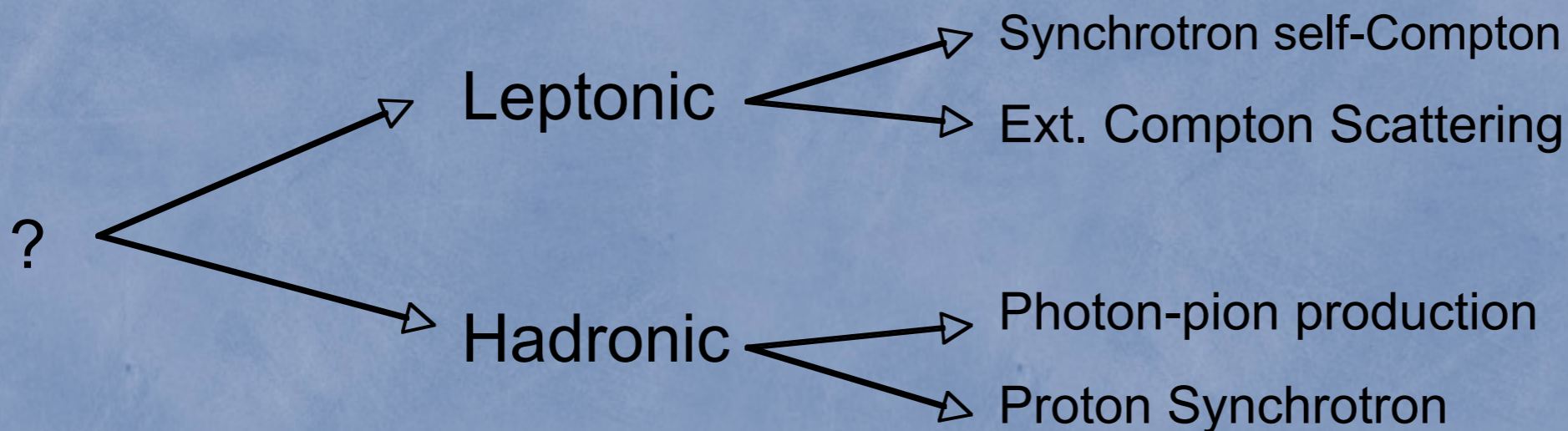
# Gamma-ray Component

## Questions:

- 👁 How are gamma-rays produced?
- 👁 Where are gamma-rays produced?
- 👁 What is the jet content?



- GLAST and multi-wavelength observations will probe the complex spectra of blazars
- Simultaneous broadband observations, combined with detailed modeling using state of the art leptonic and hadronic models will test the emission mechanisms



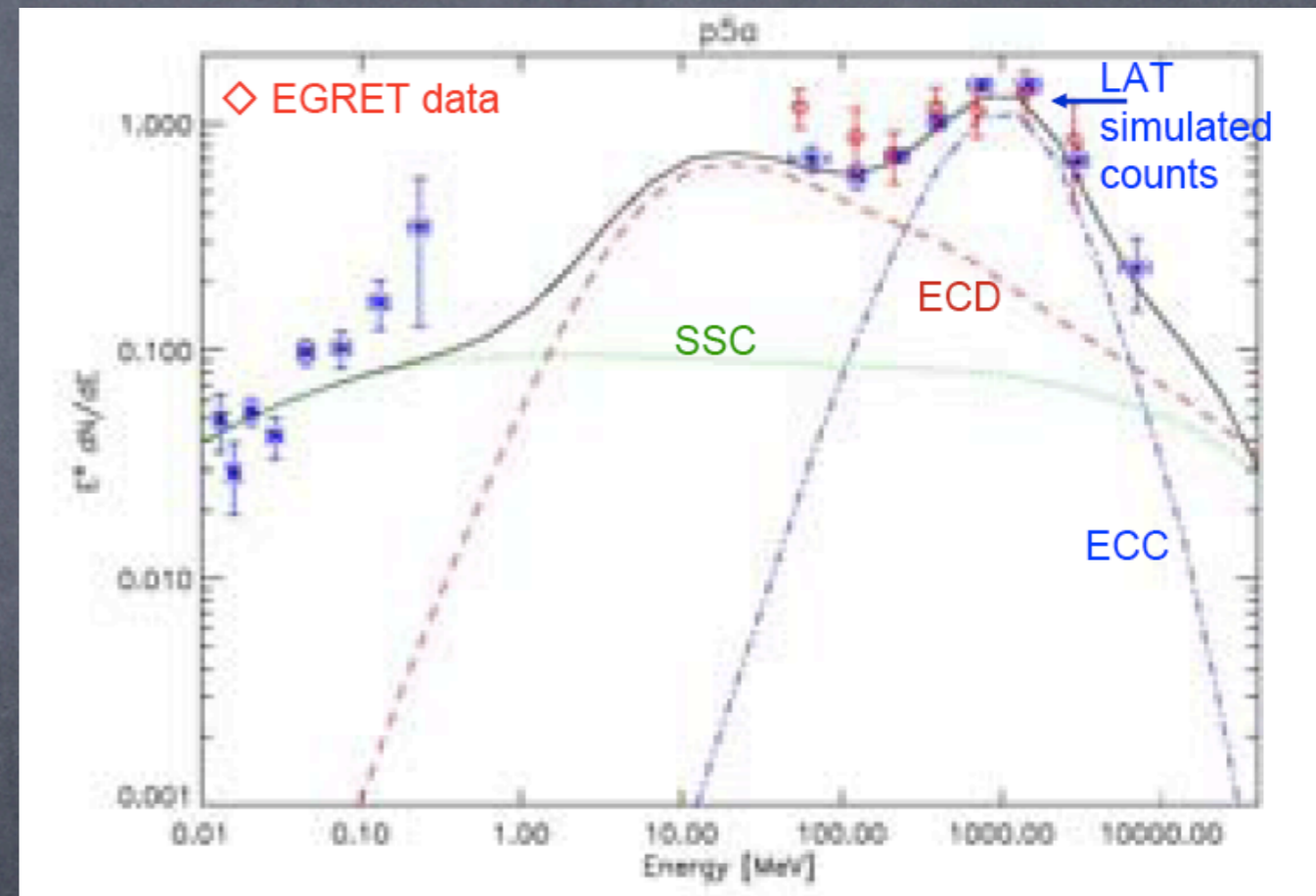
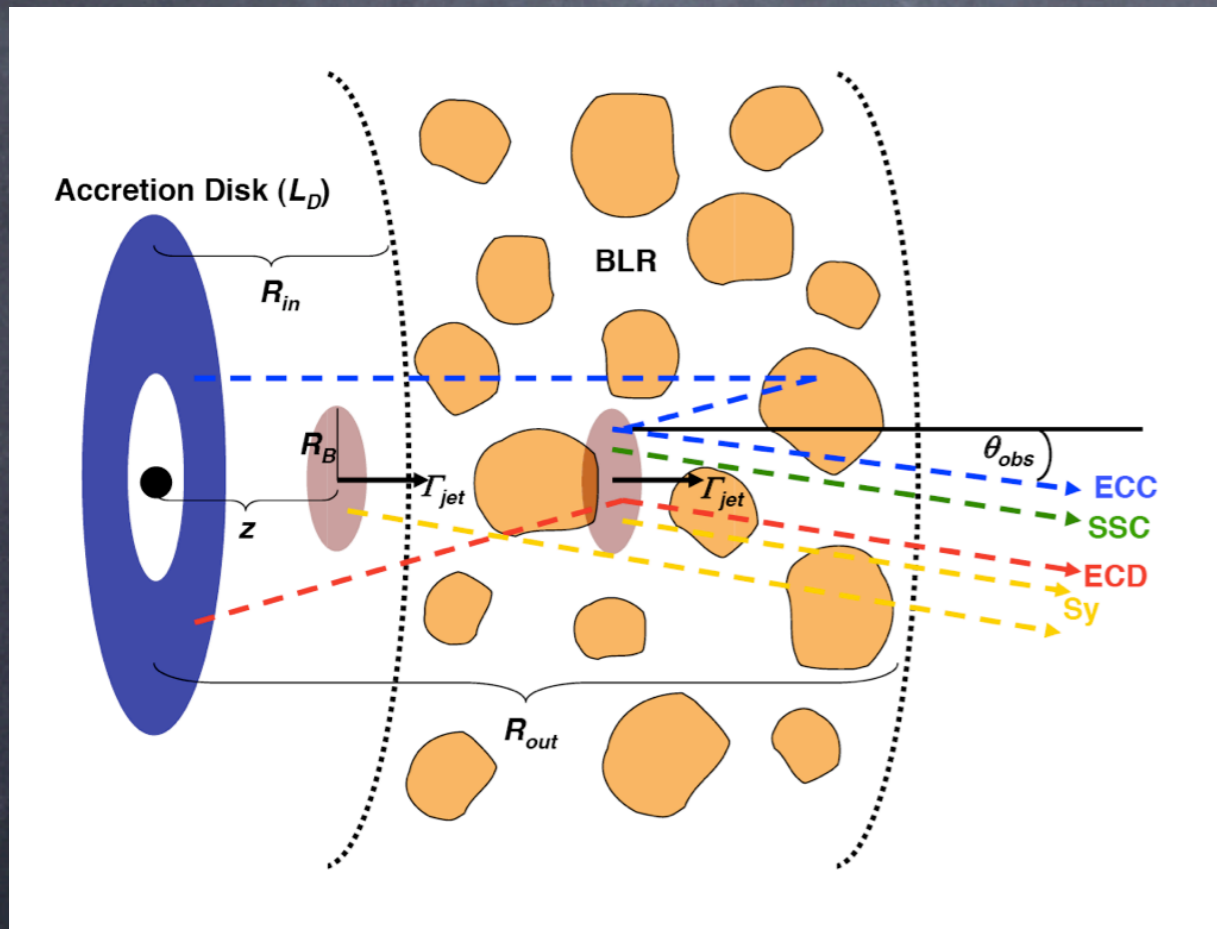


# Probing the BLR

Radiation Processes (leptonic model with impulsive pair-plasma injection):

-  Sy: synchrotron
-  SSC: synchrotron self-Compton
-  ECD: external inverse Compton of disk photons
-  ECC: external inverse Compton of BLR photons

(Carson et al. 2007)



ECC can:

-  probe the BLR geometry (e.g., there in FSRQ, absent in HBL)

