

# high-energy gamma-ray astrophysics through the years

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# Motivation: The Background

- Theory
  - Feenberg and Primakoff (1948)
  - Hutchinson (1952)
  - Hayakawa (1952)
  - Morrison (1958)
  - Hayakawa (1964)
  - Gould and Burbidge (1965)
  - Ginzburg and Syrovatskii (1965)
  - Fazio (1967)

# The Past: Motivation

- Physics



particle interactions



bremsstrahlung



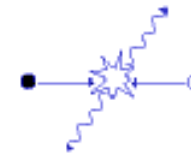
Compton scattering



radioactive decay



nucleosynthesis



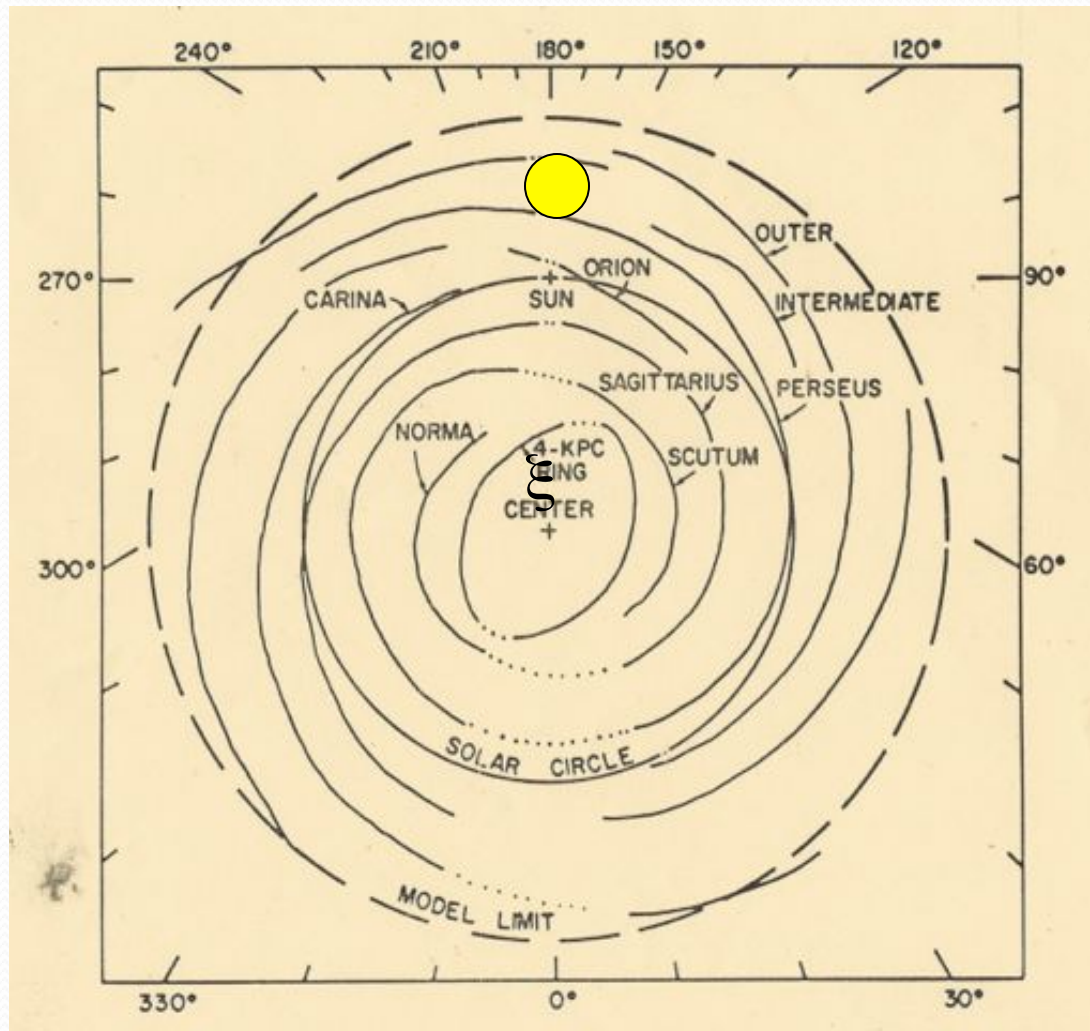
annihilation



# outline

- Motivation for gamma-ray astronomy (Theoretical basis)
- Early Instrumentation
- Early Observation
  - Balloons
  - Satellites
- Compton Gamma Ray Observatory (EGRET)

# Galactic Cosmic Rays



# Early Balloon Experiments



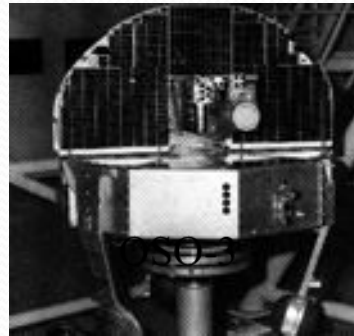
Sun Seeker



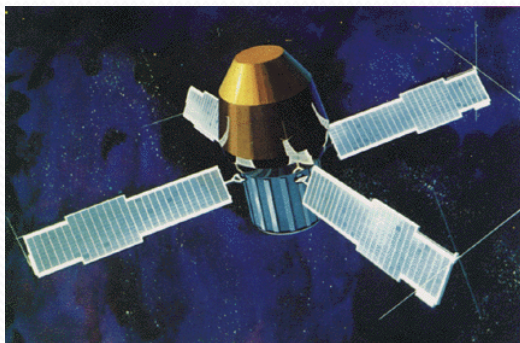
6-inch spark chamber



# Early Satellite Experiments



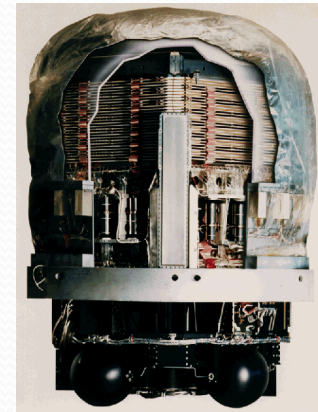
OSO-3



SAS-2



COS-B



EGRET

# Balloons



GSFC  
MPE  
CWRU  
SAO  
Cornell  
UCSD  
MISO  
NRL  
French-Italian  
UCR  
CalTech

# Satelites



Explorer XI  
OSO-3  
TD-1  
SAS-2  
COS-B  
Gamma 1  
HEAO-3  
Vela  
Beppo-Sax  
HETE

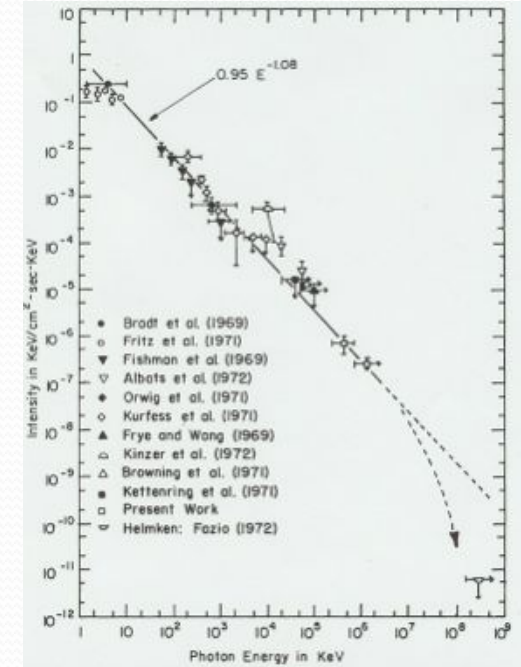
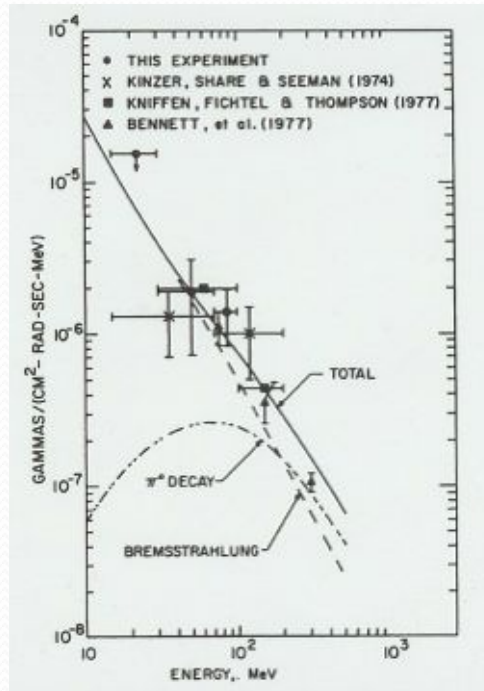
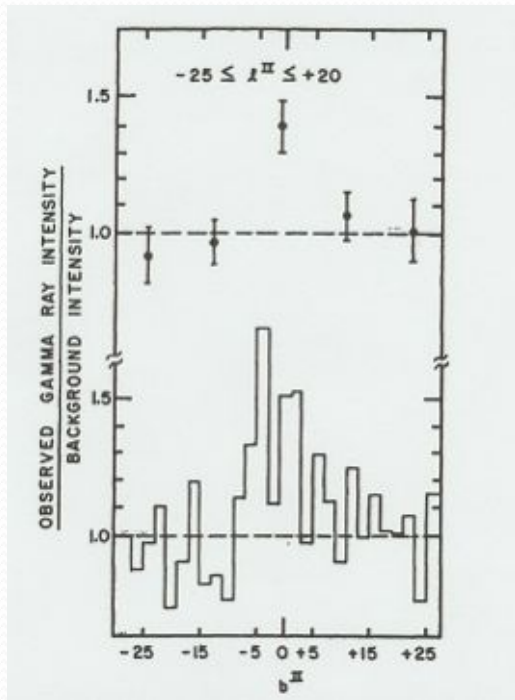
# CGRO



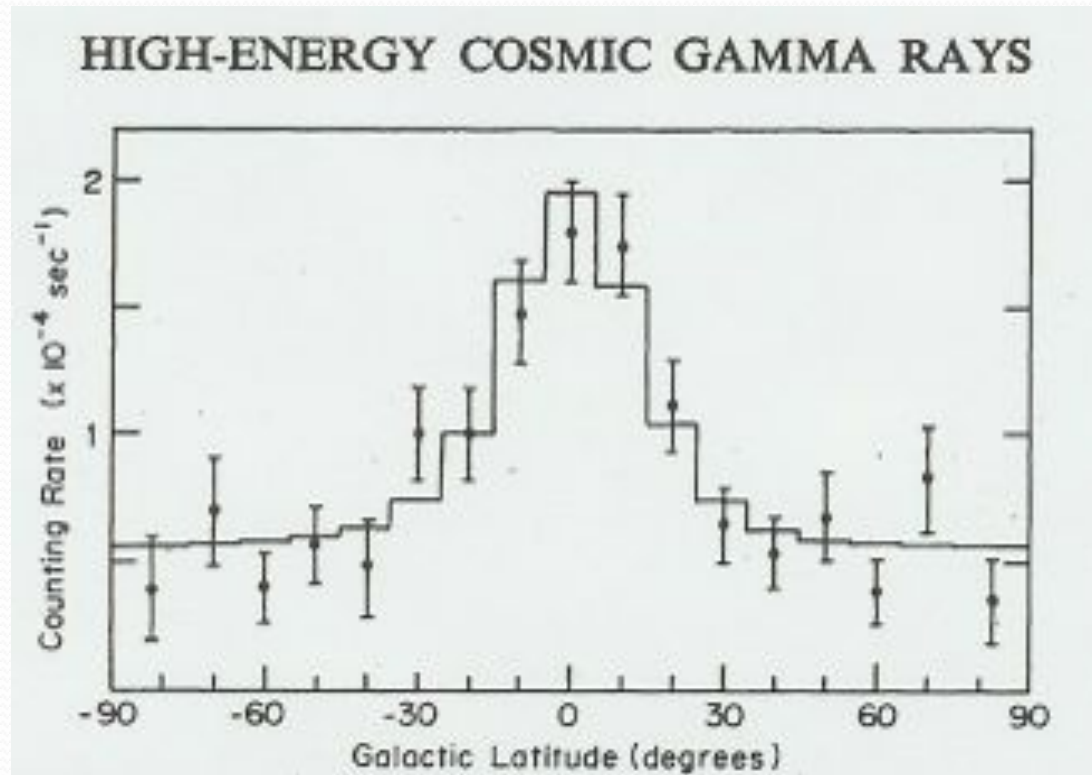
CGRO/  
EGRET  
BATSE  
COMPTEL  
OSSE



# Early Balloon Results

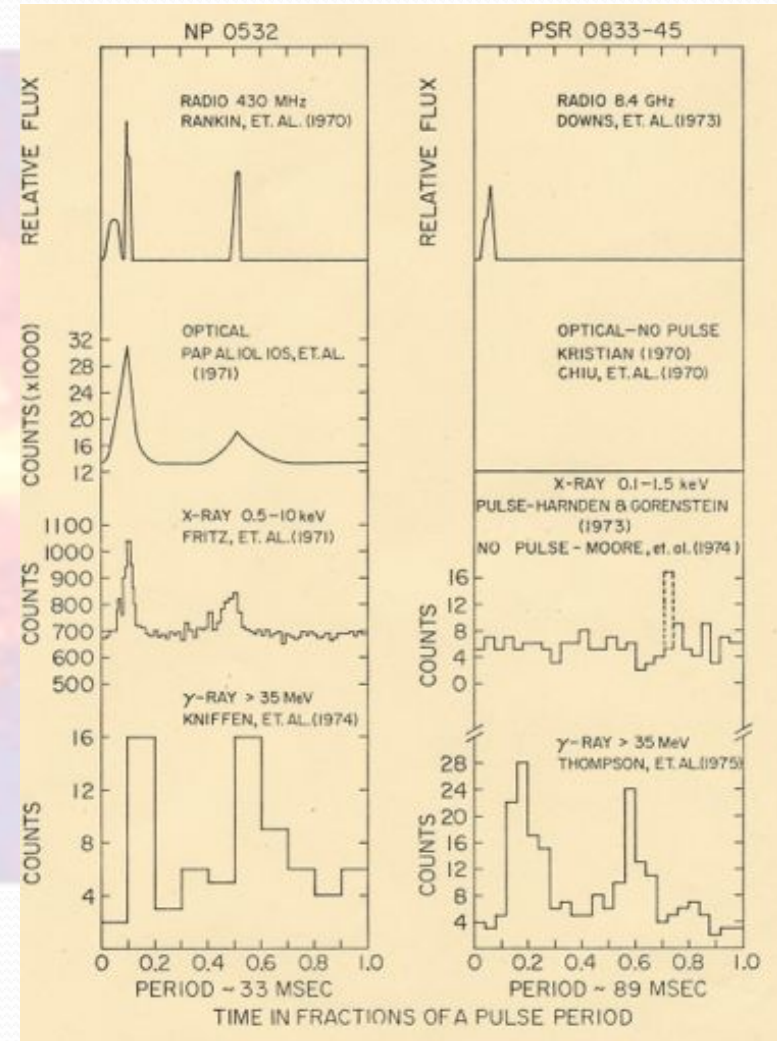
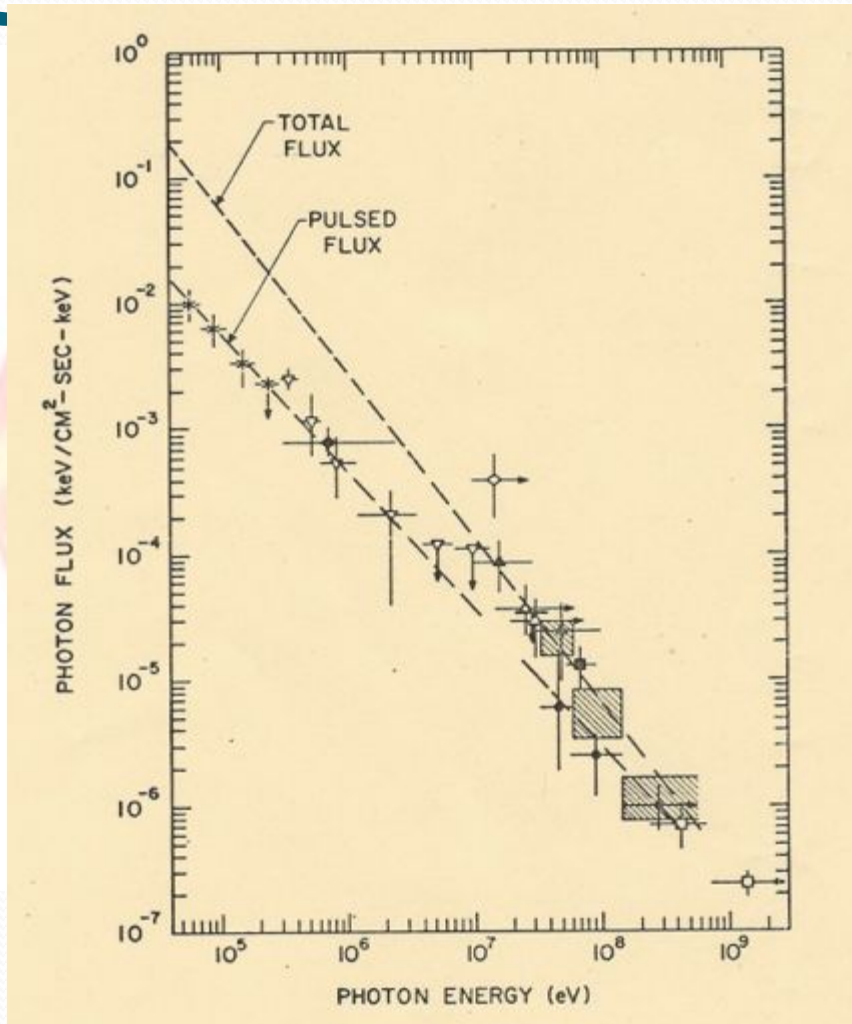


# Early Satellites: OSO-3



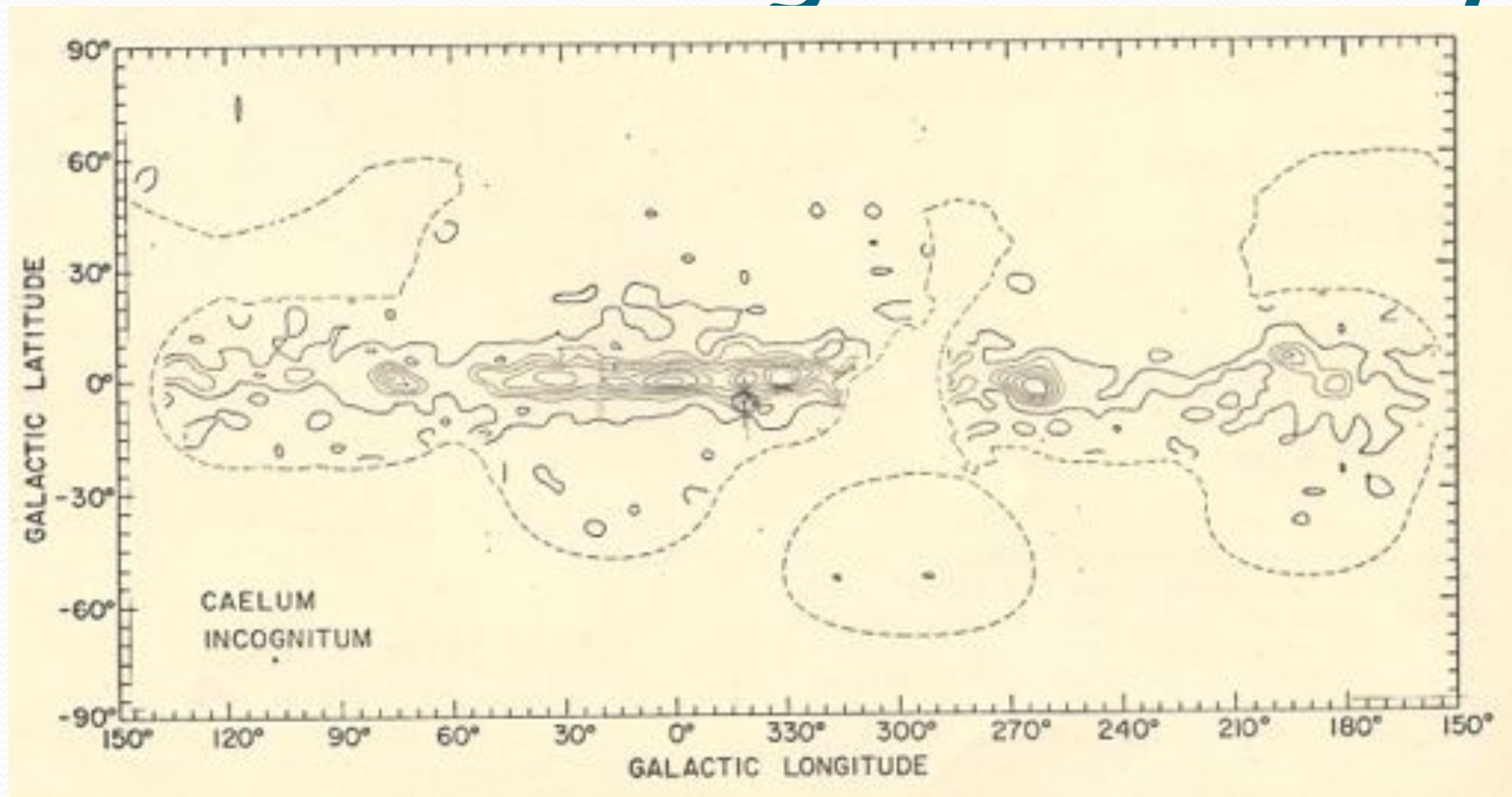
# Early Satellites: SAS-2



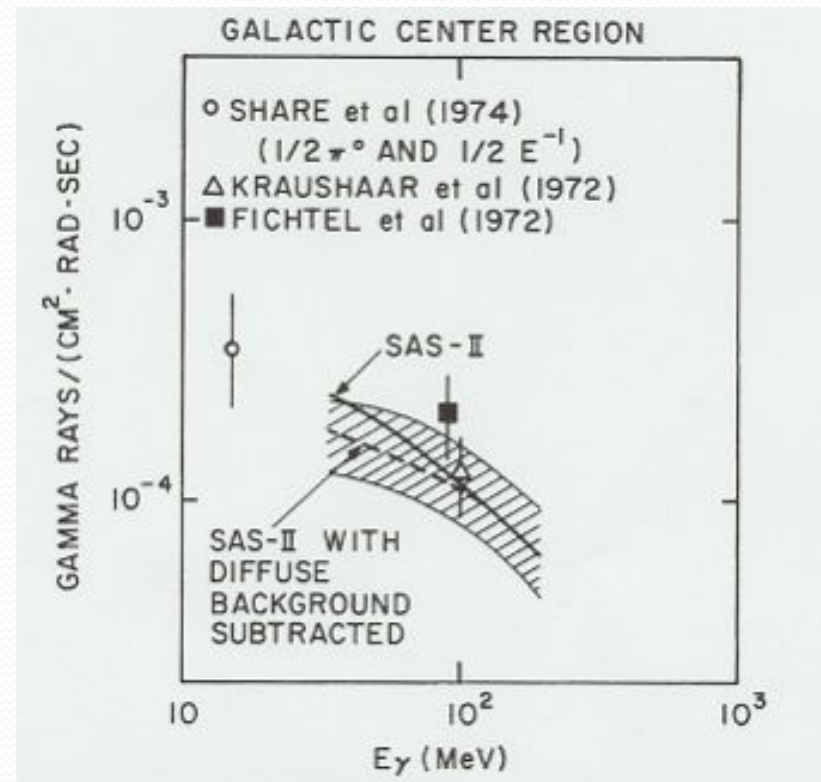
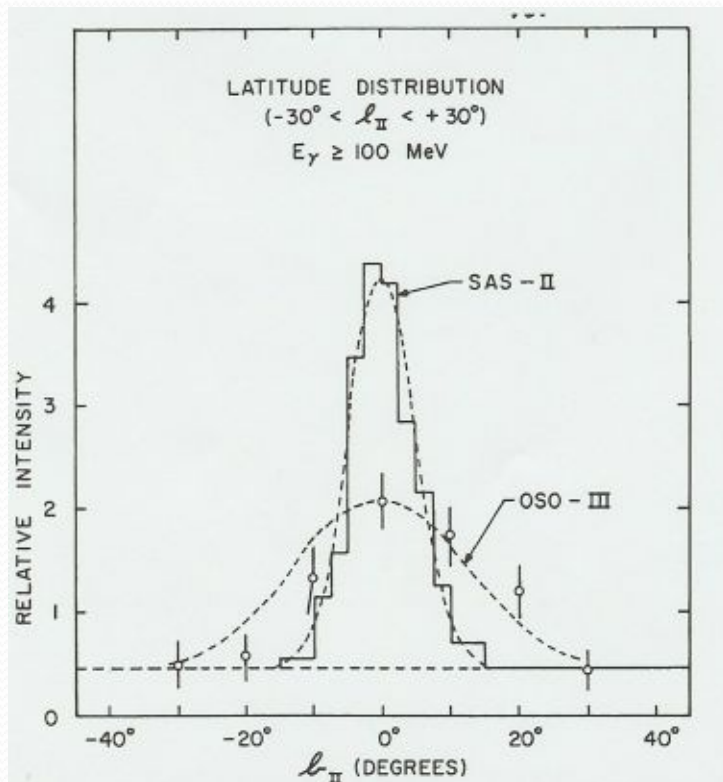




# SAS-2 Geminga Discovery

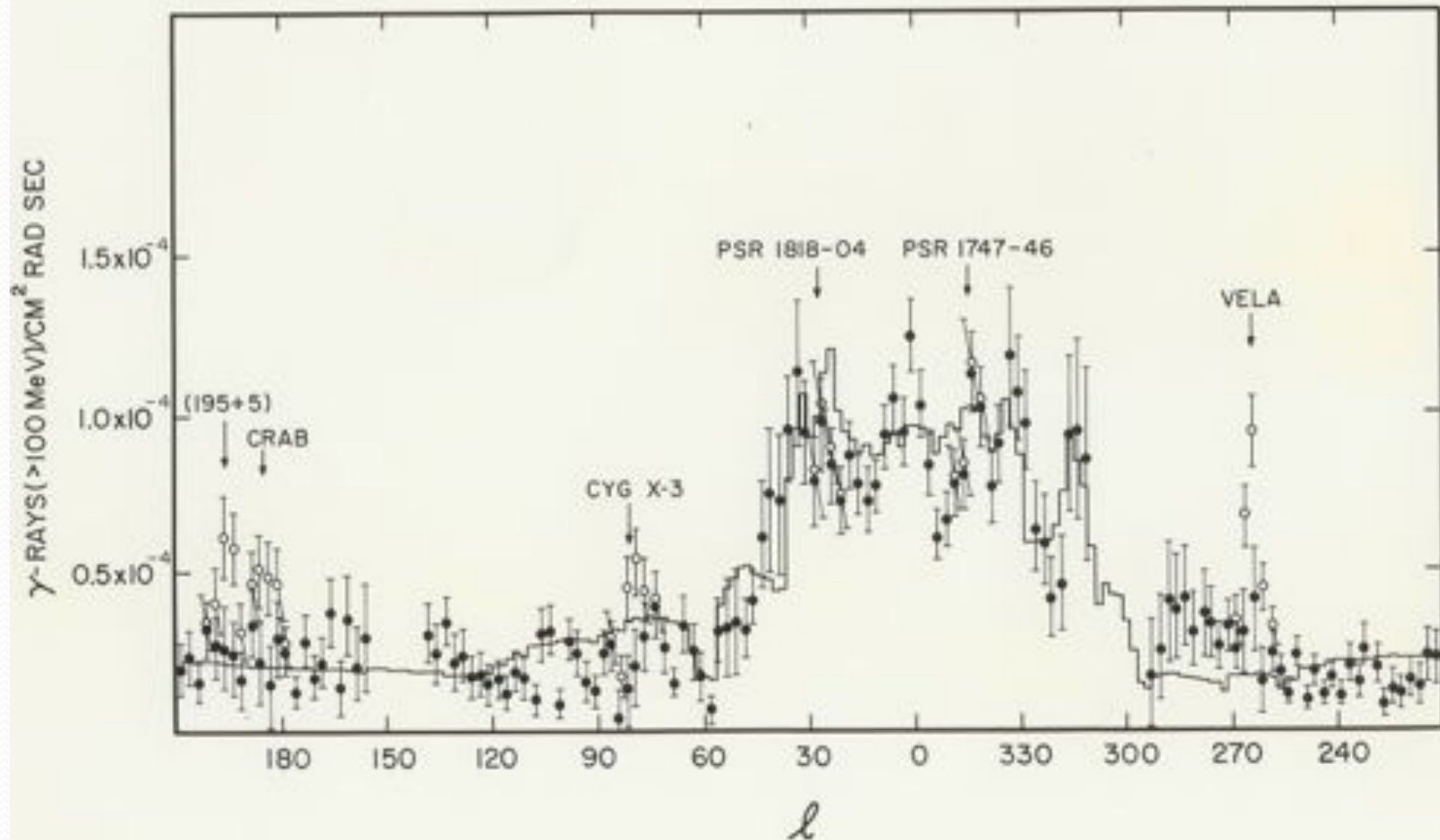


# SAS-2 Galactic Observations

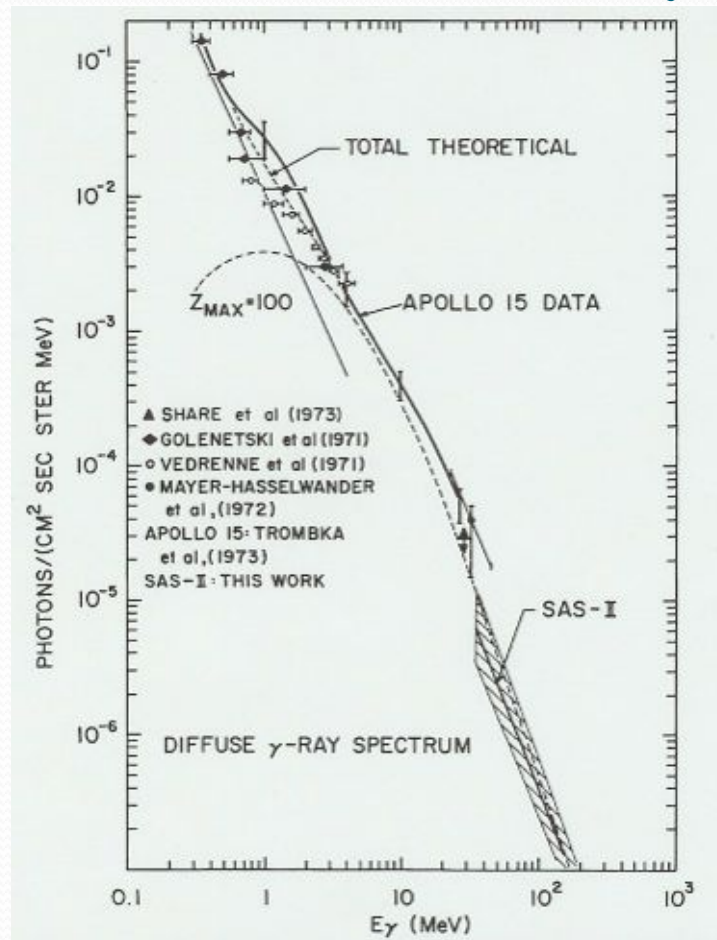




# SAS-2 Galactic Longitudes



# SAS-2 Diffuse Spectrum



# COS-B Galactic Plane Map

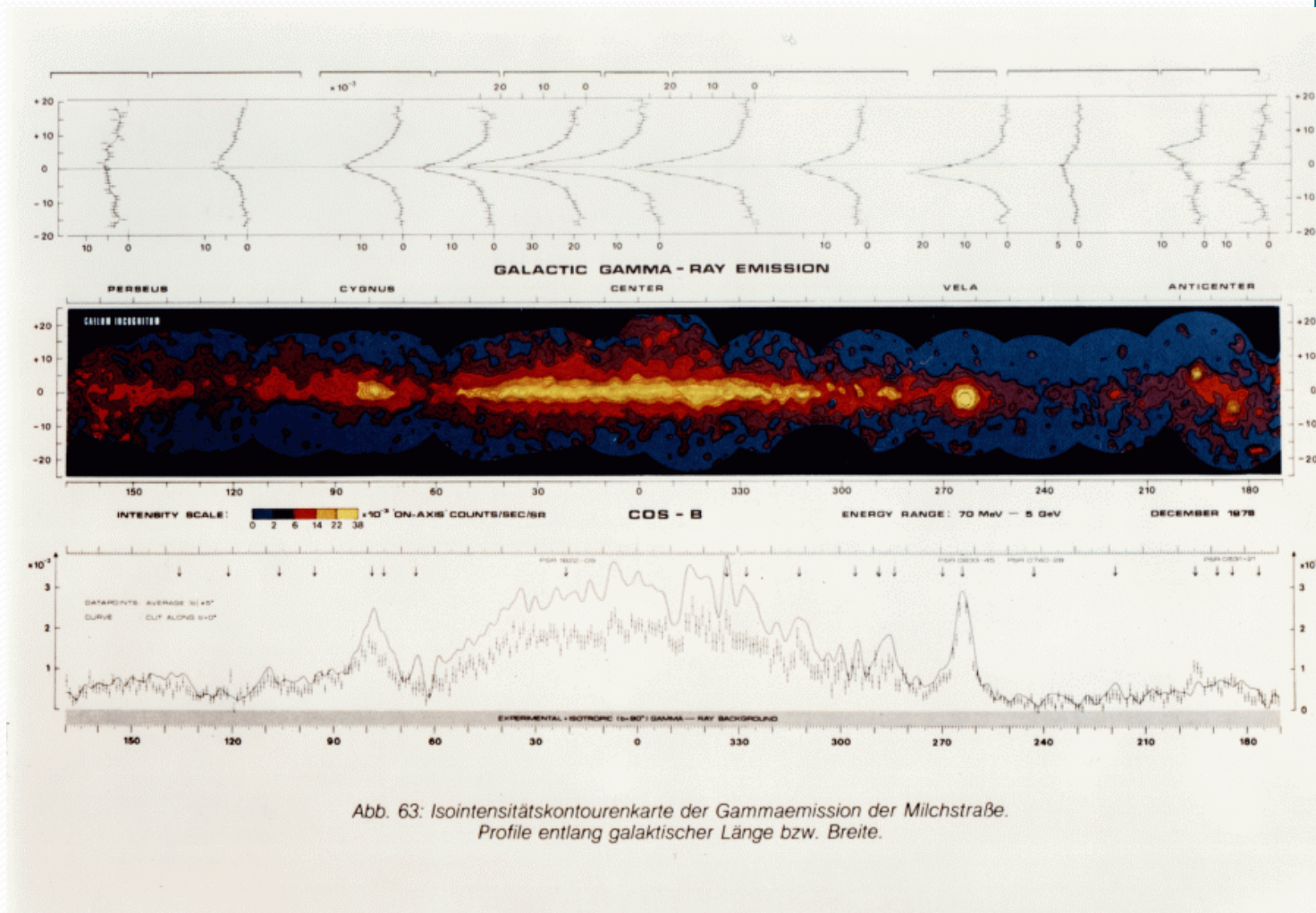
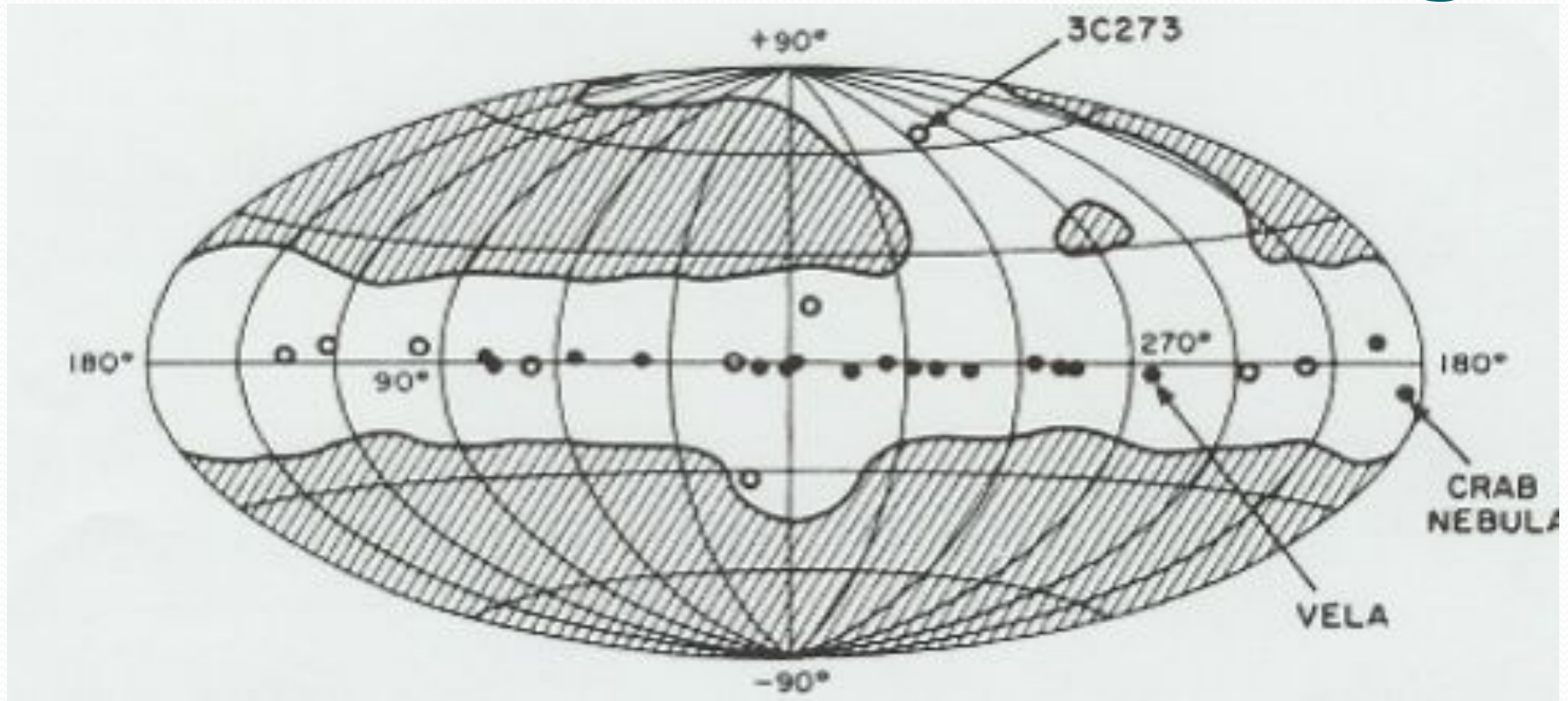


Abb. 63: Isointensitätskontourenkarte der Gammaemission der Milchstraße.  
Profile entlang galaktischer Länge bzw. Breite.

# COS-B 2CG Source Catalog







SAS-2 team celebrating success and selection of EGRET

# Compton Observatory





# Compton Observatory

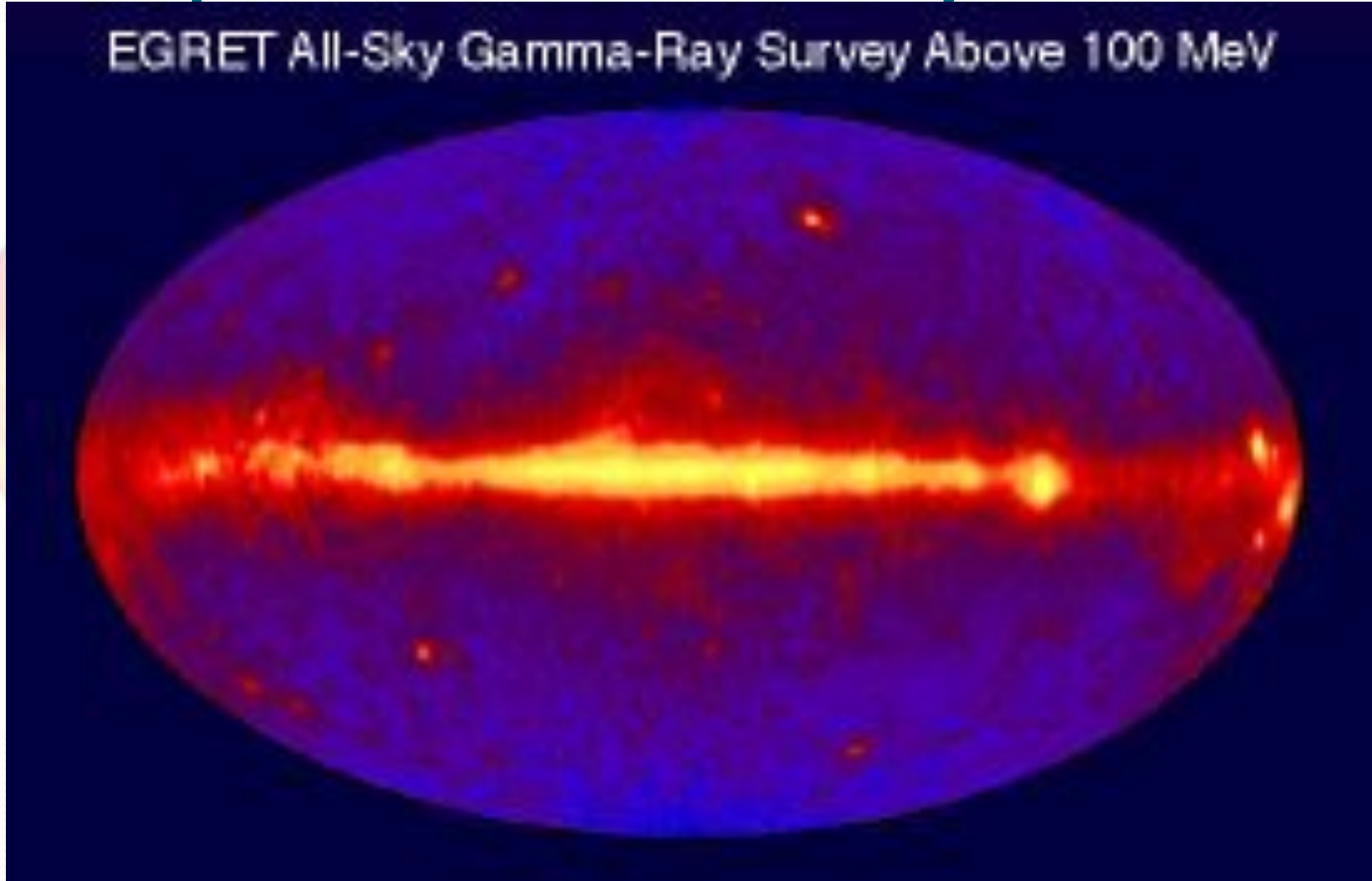


# Compton Observatory

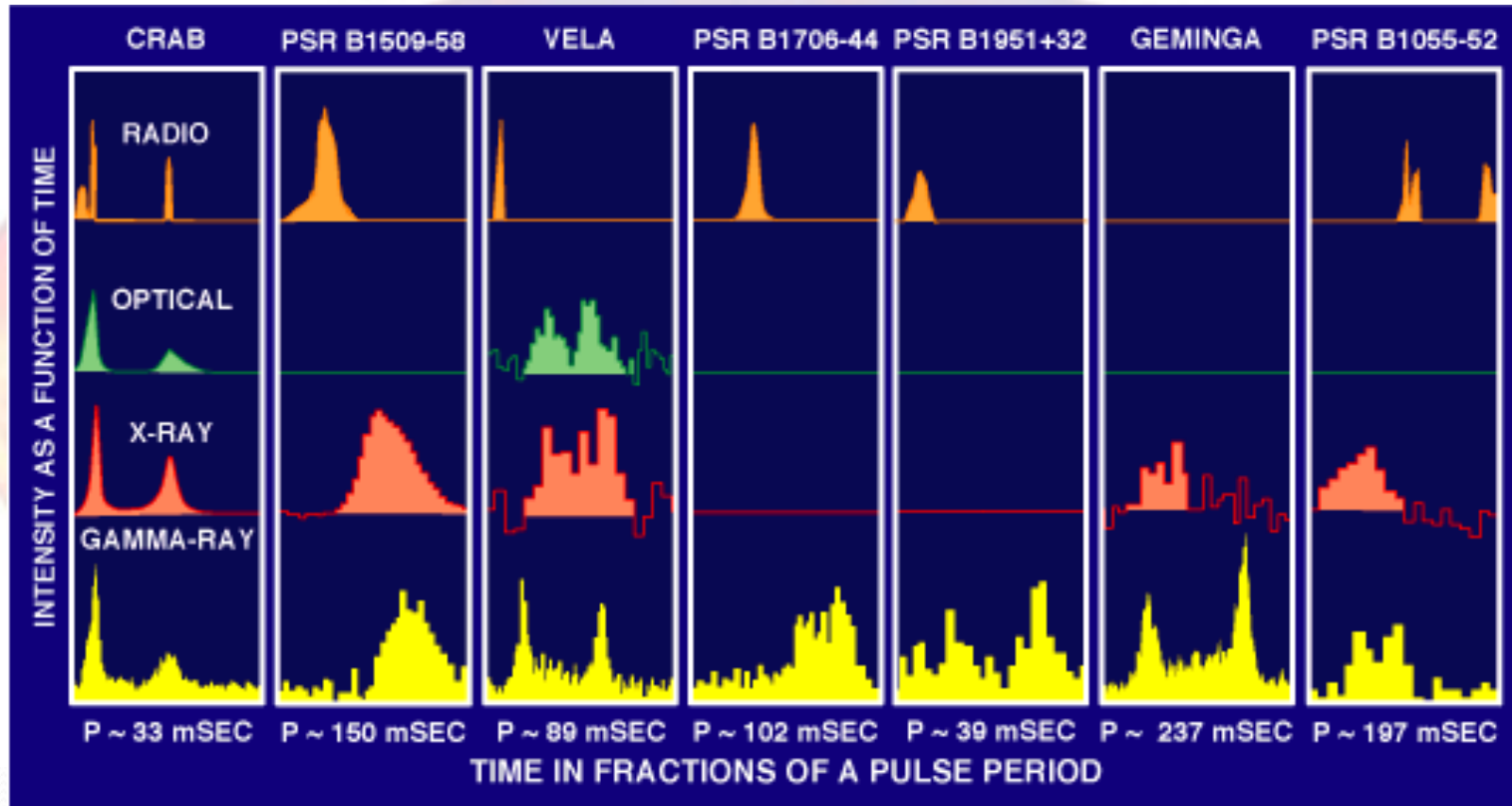


# Compton Observatory/EGRET

EGRET All-Sky Gamma-Ray Survey Above 100 MeV



# Compton Observatory/EGRET



# Compton Observatory/EGRET

## Third EGRET Catalog E > 100 MeV

