

**All Sky Survey
with an Electron-Tracking Compton and
Pair-Tracking Camera
using a gaseous Time Projection Chamber**

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Poster #: 1.09

MeV Astronomy

◆ Nucleosynthesis

SNR : Radio-isotopes

Galactic plane : ^{26}Al • Annihilation

◆ Particle acceleration

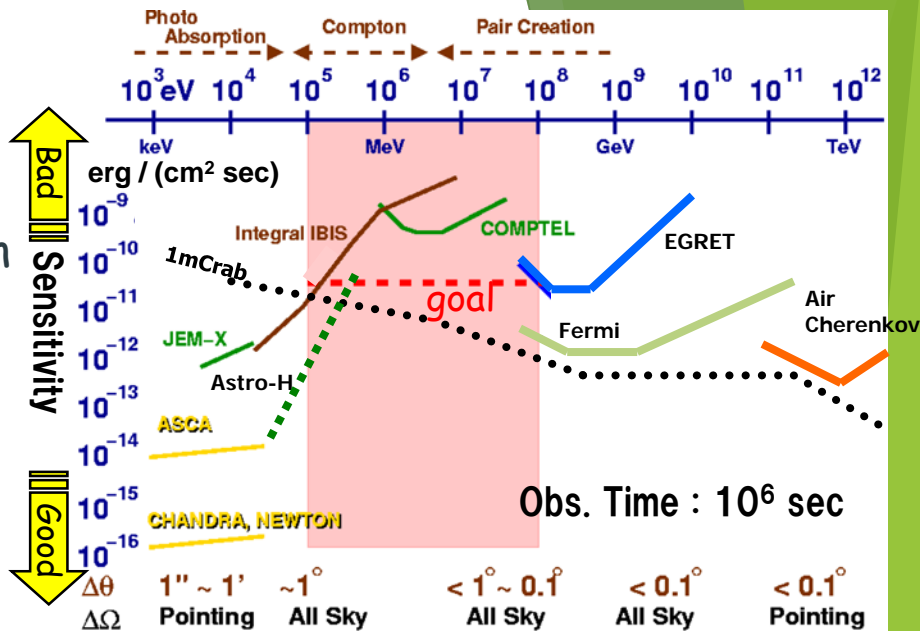
Jet (AGN) : Synchrotron
+ Inverse Compton

◆ Strong gravitational potential

Black hole : accretion disk, π^0

◆ Etc.

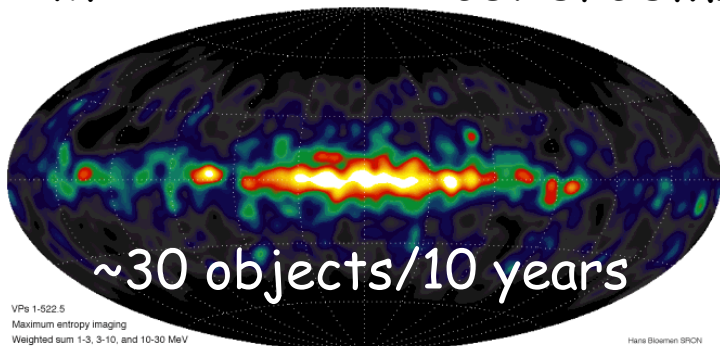
Gamma-ray Pulsar, solar flare



MeV sky map

1-30 MeV

CGRO/COMPTEL



~30 objects/10 years

VPe 1-522.5
Maximum entropy imaging
Weighted sum 1-3, 3-10, and 10-30 MeV

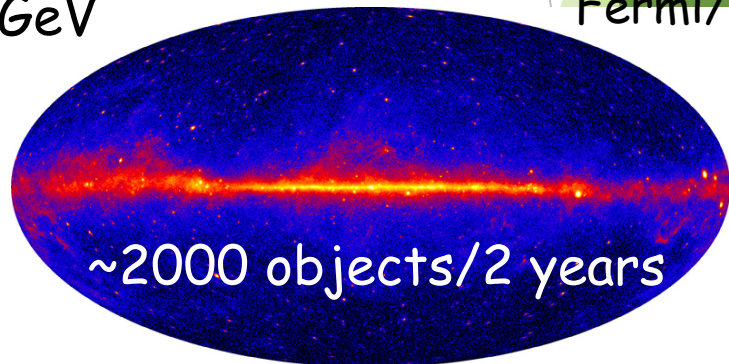
Hans Boerner SRON

V. Schönfelder+ (A&AS, 2000)

GeV sky map

> 1 GeV

Fermi/LAT



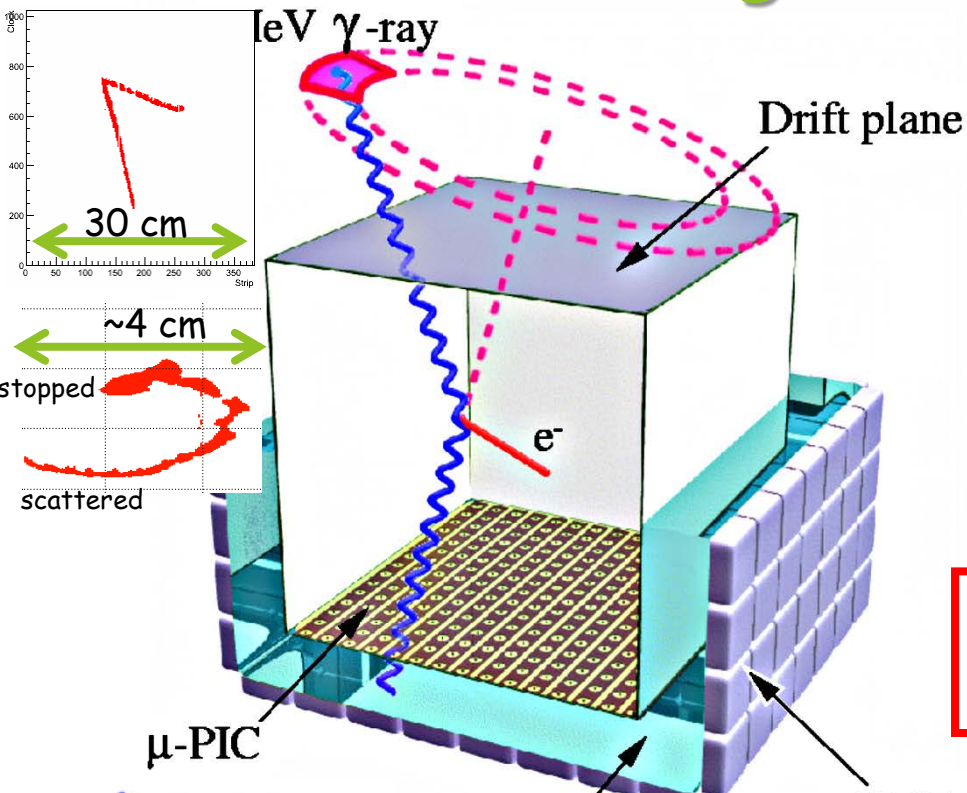
~2000 objects/2 years

P. L. Nolan+ (ApJS, 2012)

Requirements for
the next-generation detectors are ...

- Wide-band detection
- Large Field of View
- High quality image

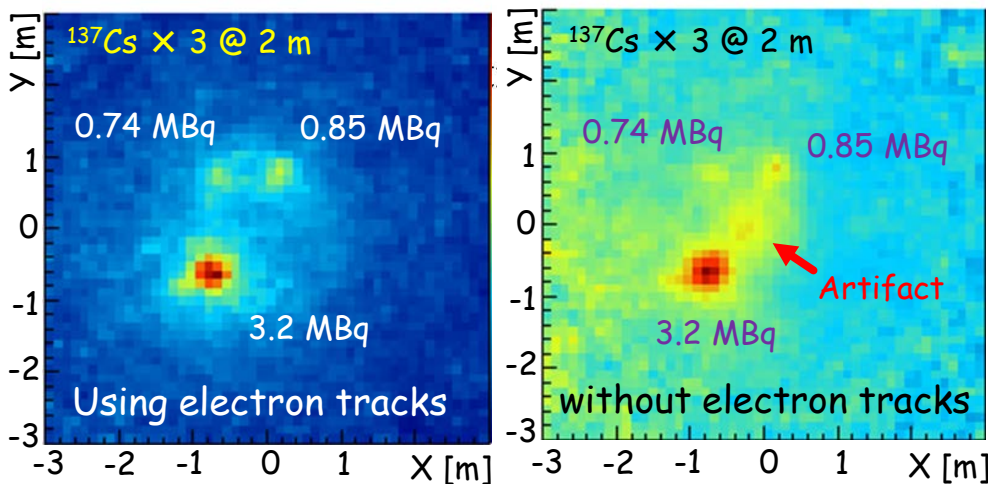
Electron-Tracking Compton Camera (ETCC)



- **Gaseous TPC : Tracker**
track and energy
of recoil electron
- **Scintillator : Absorber**
position and energy
of scattered gamma ray

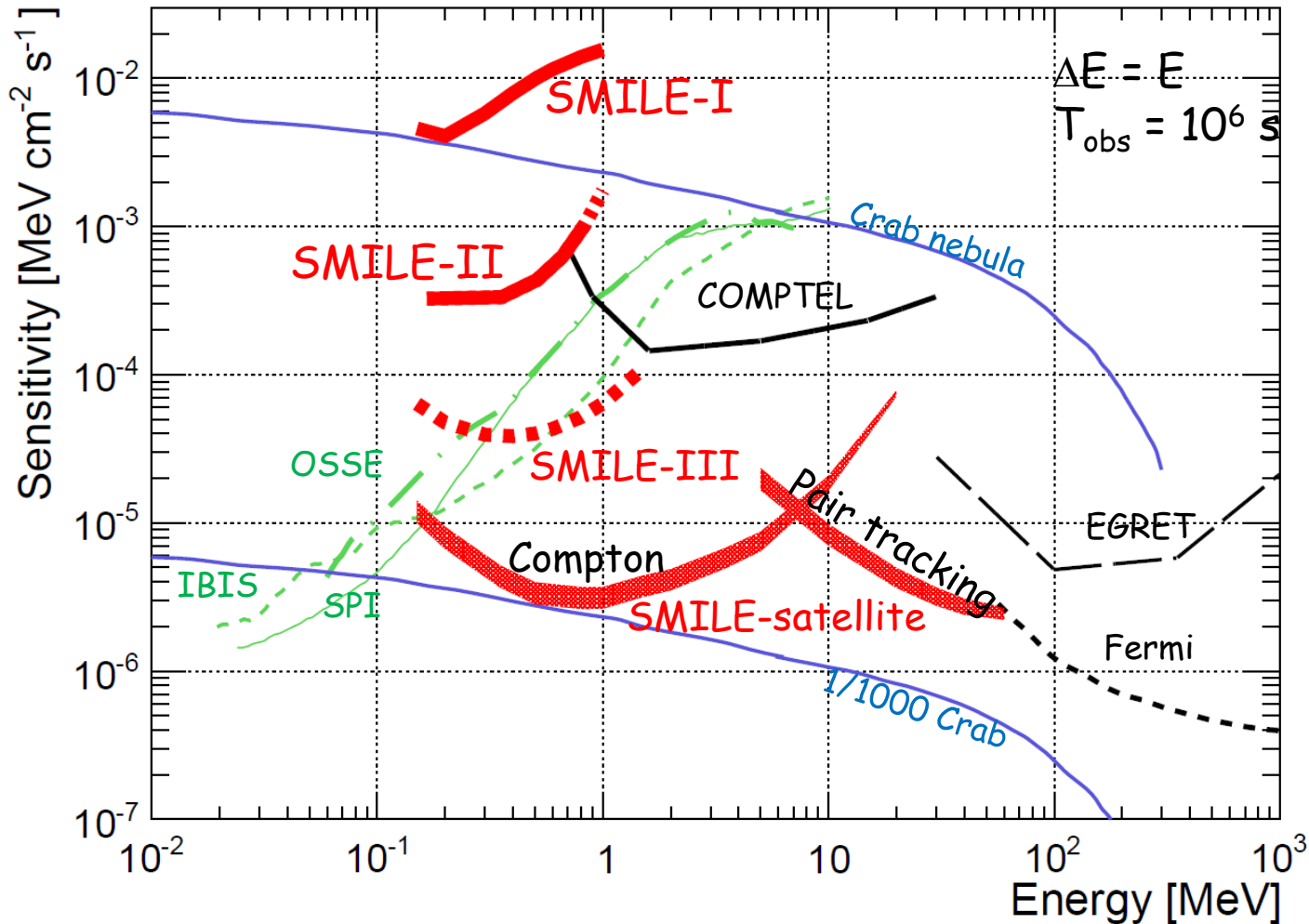


Reconstruct Compton scattering
event by event



- ▶ 1 photon \Rightarrow direction + energy
- ▶ Large FOV (~ 3 str)
- ▶ Simple structure
- ▶ **Compton Kinematical test**
with angle α
- ▶ **Particle identify with dE/dx**
- ▶ No VETO & shield around ETCC

Detection sensitivity



SMILE-II : detectable Crab nebula with 3 h at 40 km

SMILE-III : CF_4 , 3 atm and 2-3 Radiation length GSO

-> 10 times better sensitivity

Satellite : (50 cm-cube, Xe 3 atm, 10 Rad. Len. LaBr_3) $\times 4$

-> reach to 1 mCrab