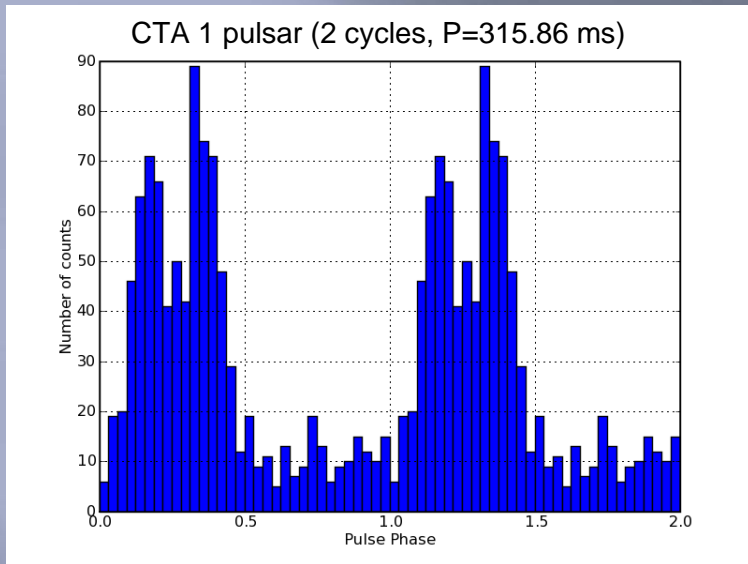
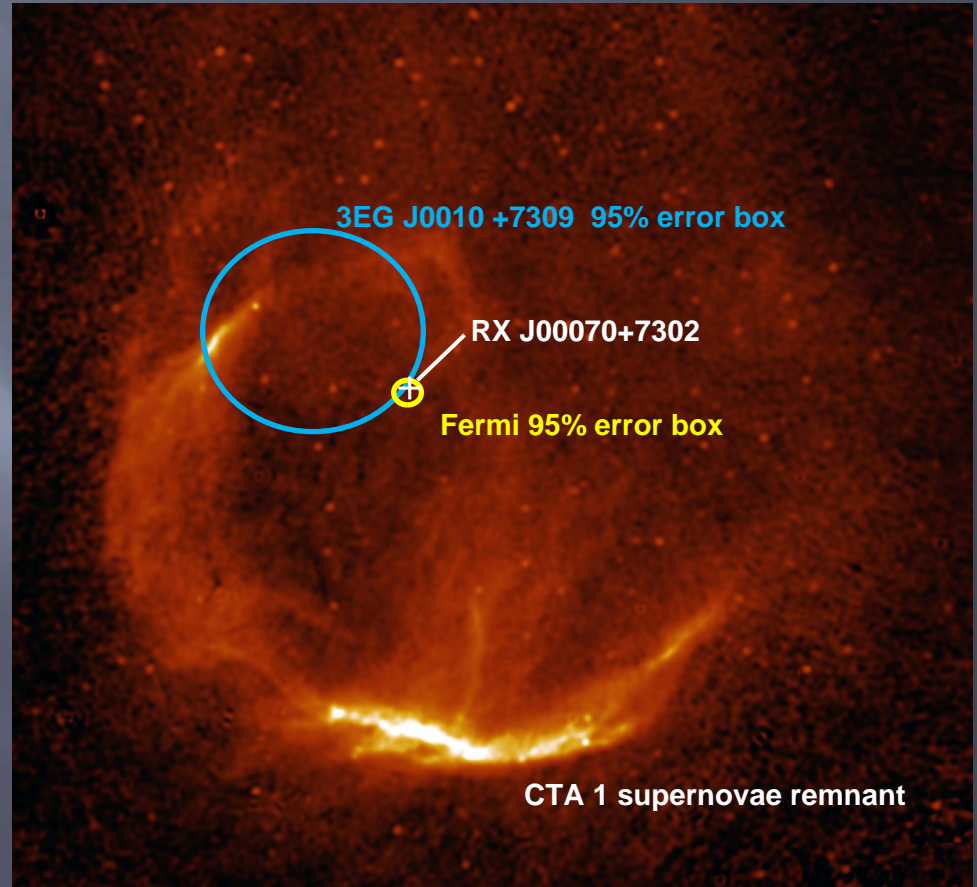


Pulsar in CTA 1



- exhibits all characteristics of a young high-energy pulsar (characteristic age $\sim 1.4 \times 10^4$ yr), which powers a synchrotron pulsar wind nebula embedded in a larger SNR.
- spin-down luminosity $\sim 10^{36}$ erg s^{-1} , sufficient to supply the PWN with magnetic fields and energetic electrons.

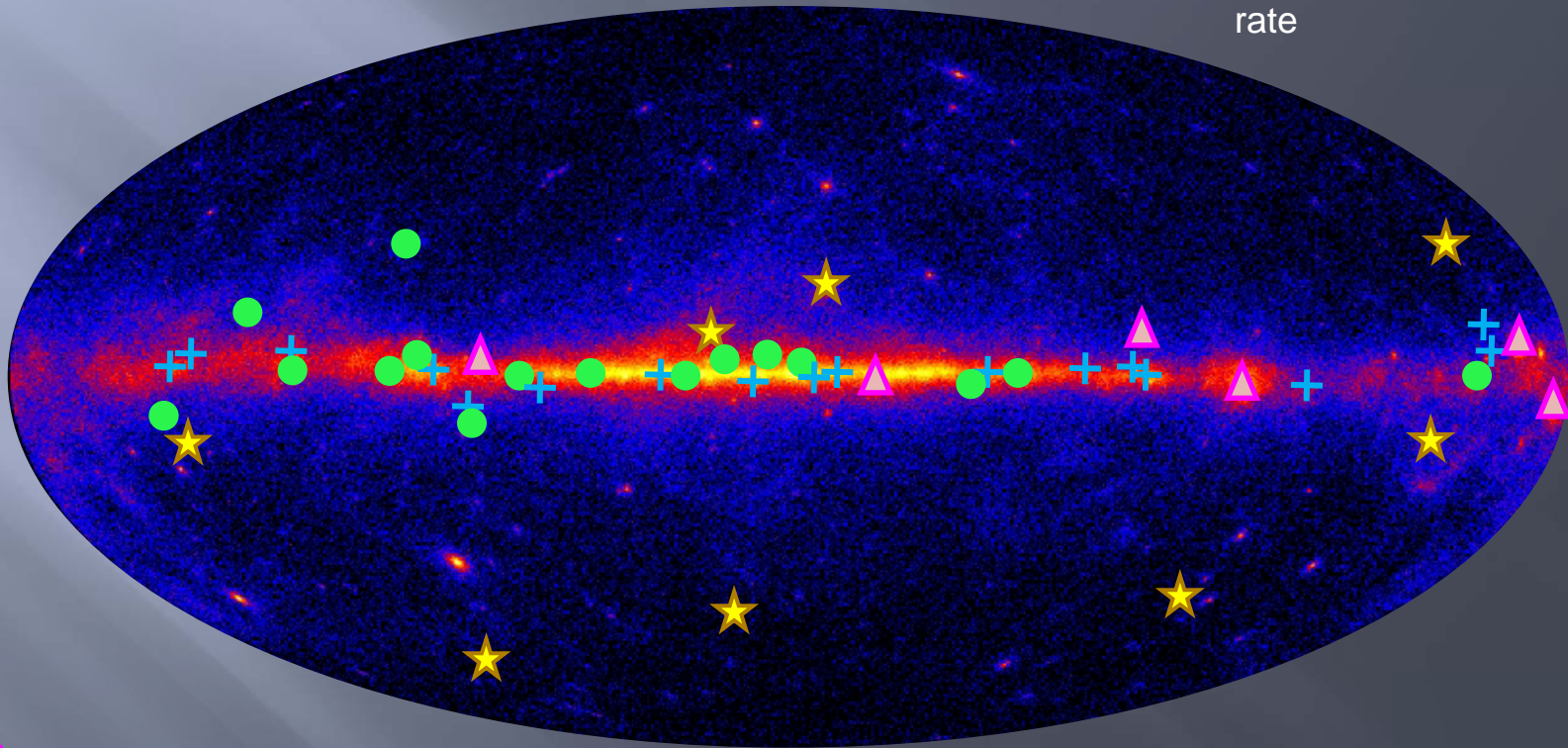
Science 322,1218 (2008)



- γ -ray source at $l, b = 119.652, 10.468$; 95% error circle radius $= 0.038^\circ$ contains the X-ray source RX J00070+7302, central to the PWN superimposed on the radio map at 1420 MHz.
- pulsar off-set from center of radio SNR; rough estimate of the lateral speed of the pulsar is ~ 450 km/s

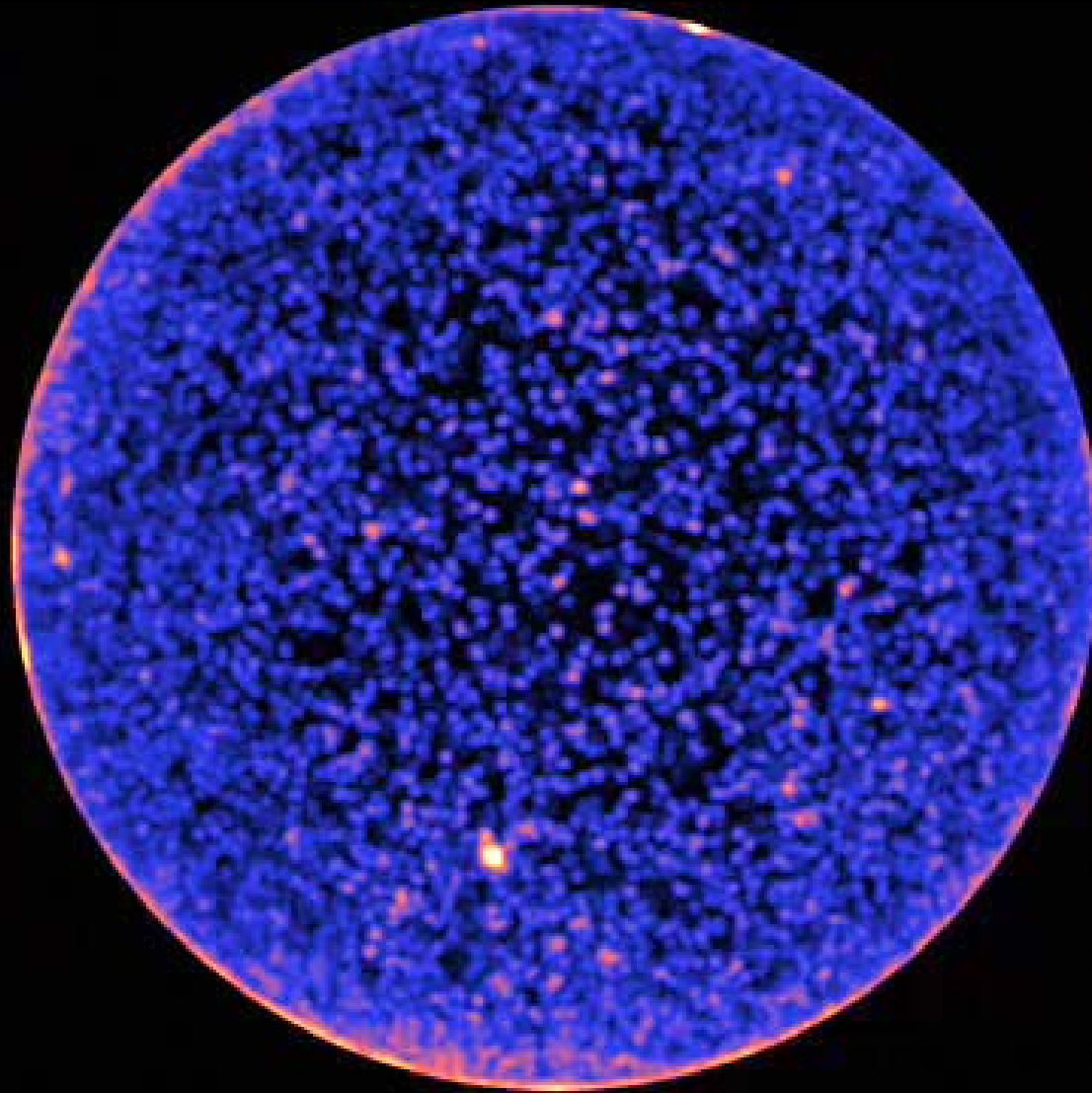
Fermi Pulsars

Pulses at 1/10th real rate



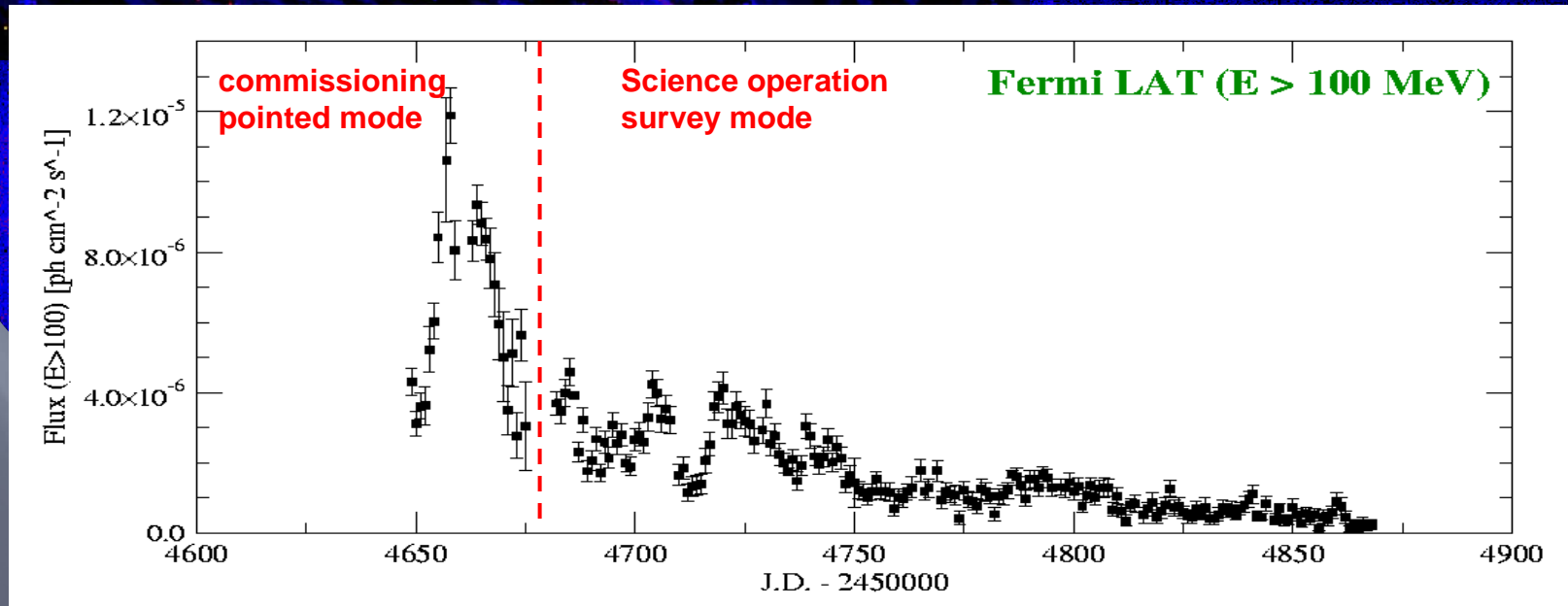
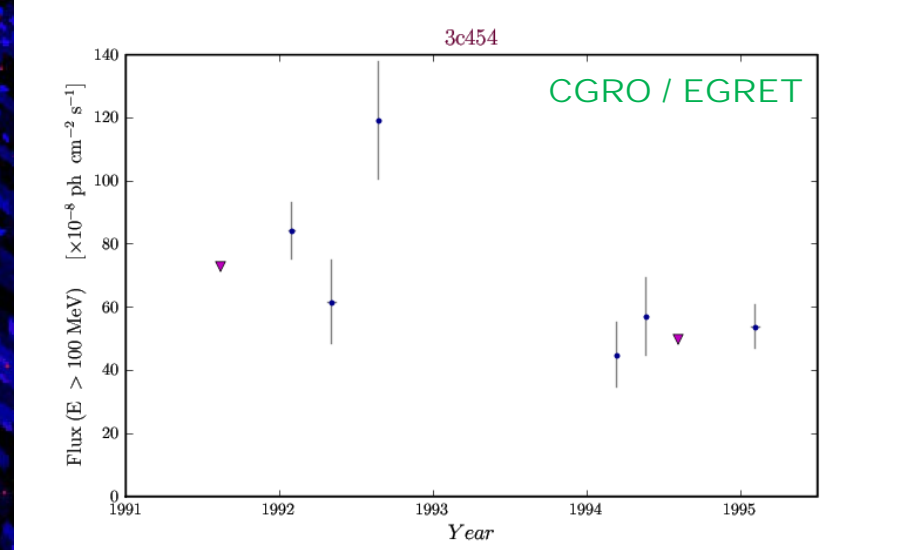
- ▲ EGRET pulsars
- + young pulsars discovered using radio ephemeris
- pulsars discovered in blind search
- ★ millisecond pulsars discovered using radio ephemeris

The Northern Galactic sky



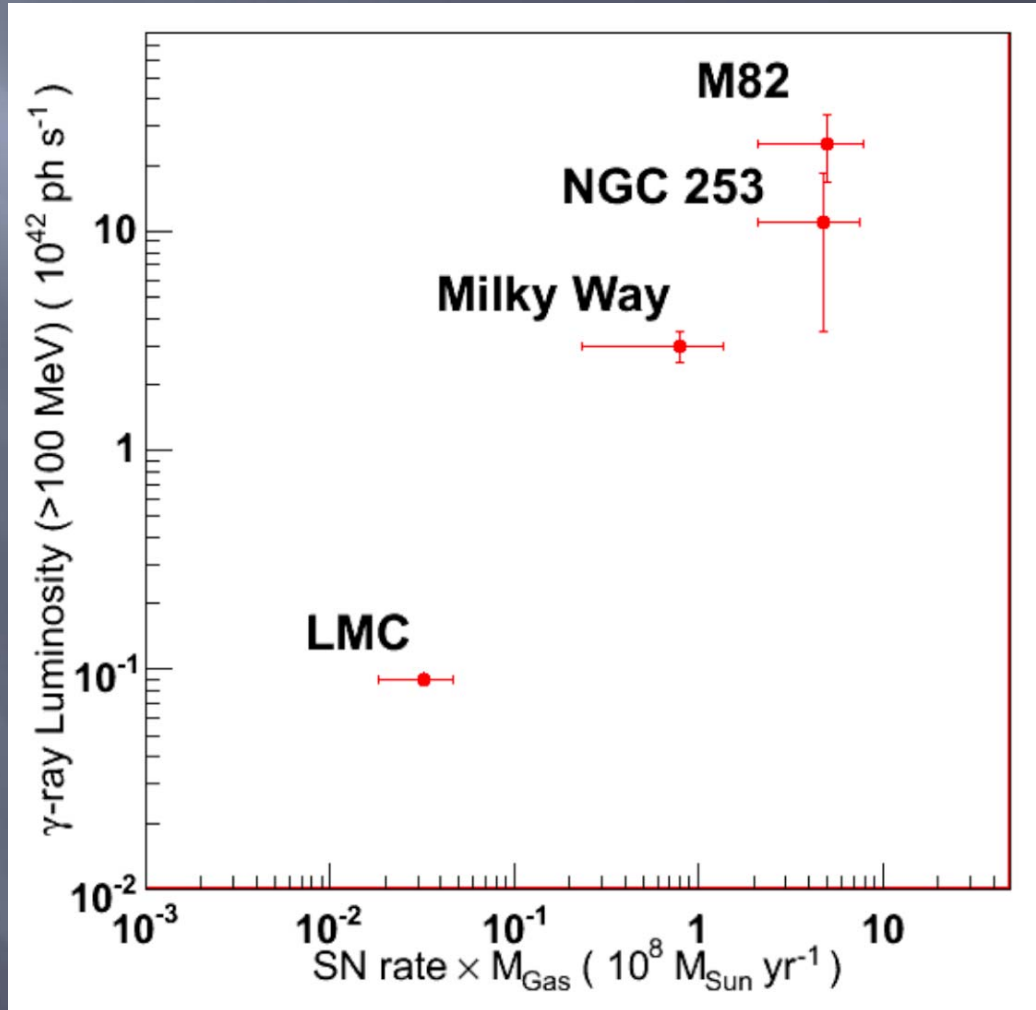
3C454.3

Supermassive black hole
8 billion light-years from us



Cosmic Rays and galaxies

Fermi has detected GeV emission from starburst galaxies for the first time



An intergalactic race in space and time

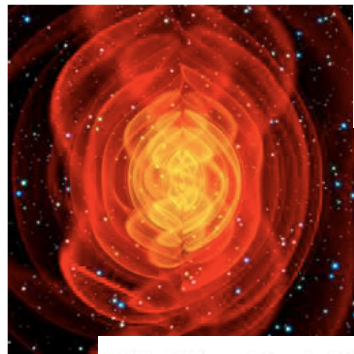
A burst of γ -rays lets scientists test quantum theories of gravity.

[Geoff Brumfiel](#)

Astronomers have used a high-energy burst of light from a distant galaxy to test the fabric of space and time. The work is the best test yet of attempts to create a 'theory of everything'.

At present, two separate theories dominate the world of physics. General relativity explains gravity and the motion of large objects such as planets, stars and galaxies, whereas quantum-mechanics explains the behaviour of very small things such as atoms.

Both theories do well at explaining their respective worlds, but they don't fit together mathematically. The problem is as fundamental as it gets: the two see space and time very differently, according to Giovanni Amelino-Camelia, a theoretical physicist at the University of Rome La Sapienza in Italy.



Space-time theory of

Chris F.

Einstein was right! Nasa Fermi telescope uncovers proof of famous space-time theory

By [Daily Mail Reporter](#)

Last updated at 2:53 AM on 31st October 2009

Racing across the Universe for the last 7.3-billion-years, two highly charged particles have arrived at Nasa's Fermi Gamma-ray Space Telescope within a second of one another. Excited scientists believe this could be evidence of Einstein's space-time theory.

The photons were launched on their marathon during a short gamma-ray burst, an outpouring of radiation likely generated by the collision of two neutron stars, the densest known objects in the Universe.

One of the photons possessed a million times more energy than the other but they arrived at almost the same time.

The New York Times

Space & Cosmos

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7.3 Billion Years Later, Einstein's Theory Prevails

By DENNIS OVERBYE

Published: October 28, 2009

Astronomers said Wednesday that a race halfway across the universe had ended in a virtual tie. And so the champion is still [Albert Einstein](#) — for now.

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Collaboration during year 2

- Extensive discussions at September collaboration meeting about collaboration in year 2 and beyond
 - High-level photon data released to scientific community on August 11, 2009 and continues
 - Collaboration has remained active and intact. Members generally recognize value of being in the LAT Collaboration
 - Consistent with collaboration membership and publication policies, there will be significantly more CAT 2 papers in year 2; there will also be many CAT 1 papers as well.
 - CAT 1 papers are for discovery results and initial papers on key projects