

Observation of TeV Gamma Rays from RXJ1713.7-3946

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(proxy for R.Enomoto)

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CANGAROO Collaboration

- Collaboration of Australia and Nippon for a Gamma Ray Observatory in the Outback

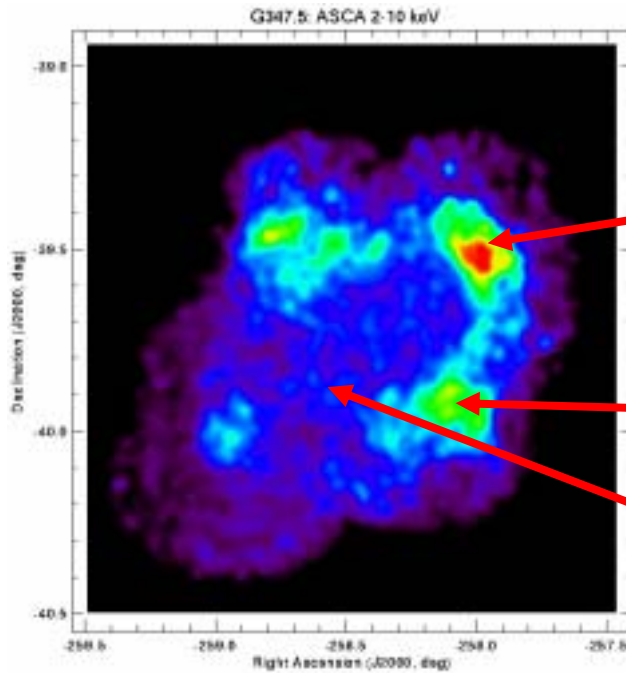


- ◇ Institute for Cosmic Ray Research, U. Tokyo
- ◇ Other 14 Japanese Institutes
- ◇ University of Adelaide
- ◇ Australian National University

Site: South Australia,
Woomera

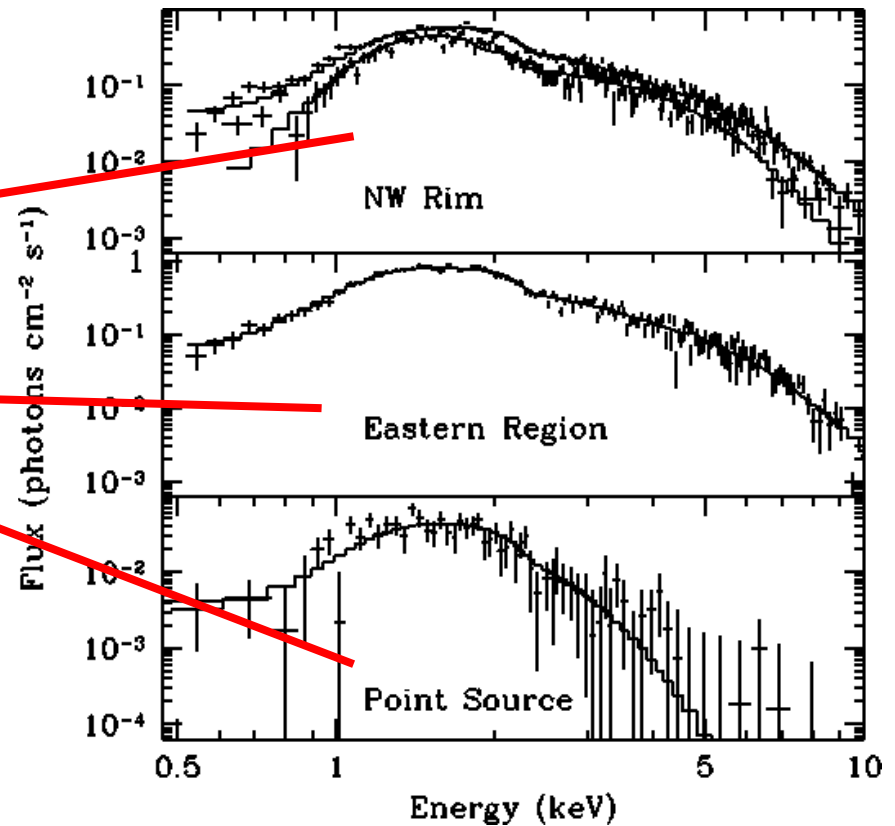
31° 06' S
136° 47' E
160m a.s.l.

ASCA X-ray Observation of RXJ1713,7-3946



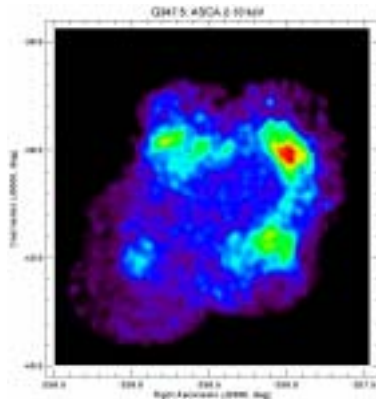
Synch. X-ray
Emission(ASCA)

Tomida, Ph.D., 1999



Slane et al, ApJ, 525,1999

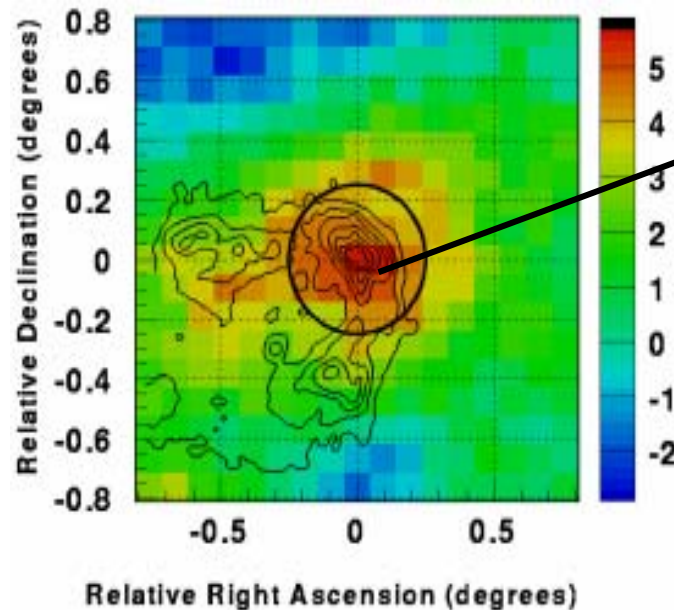
TeV gamma rays from RXJ1713



RXJ1713.7-3946

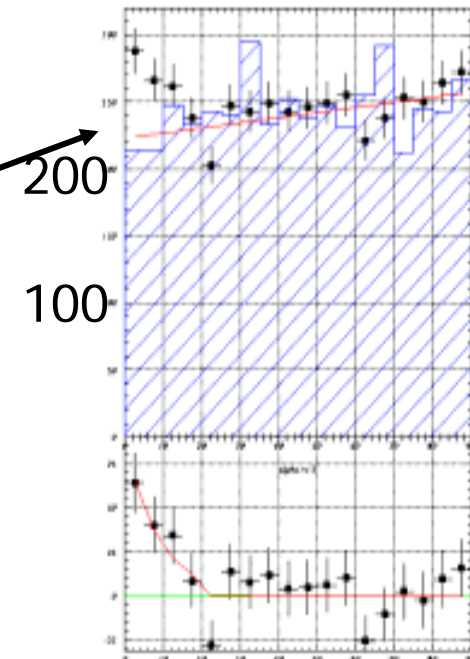
Synch. X-ray
Emission(ASCA)

Tomida, Ph.D., 1999



TeV-Gamma
3.8m Tele.

Muraishi et al., A&Ap 354, 2000

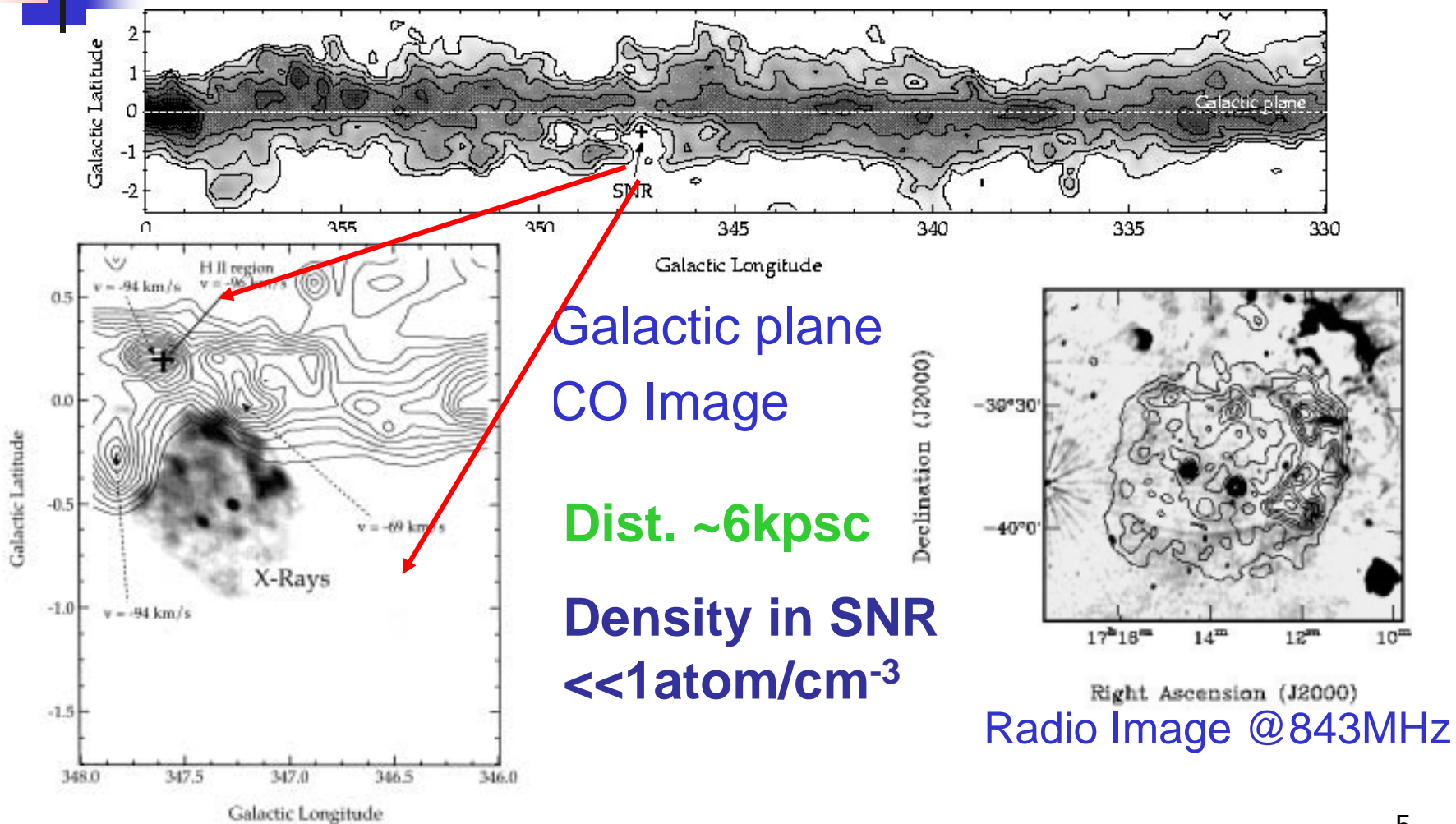


α
7m Tele. 1999 (16hours)

$E_\gamma > \sim 1\text{TeV} (E^{-2.5})$

Proximity of RXJ1713.7-3946

Slane et al, ApJ, 525,1999



Galactic plane
CO Image

Dist. ~6kpsc

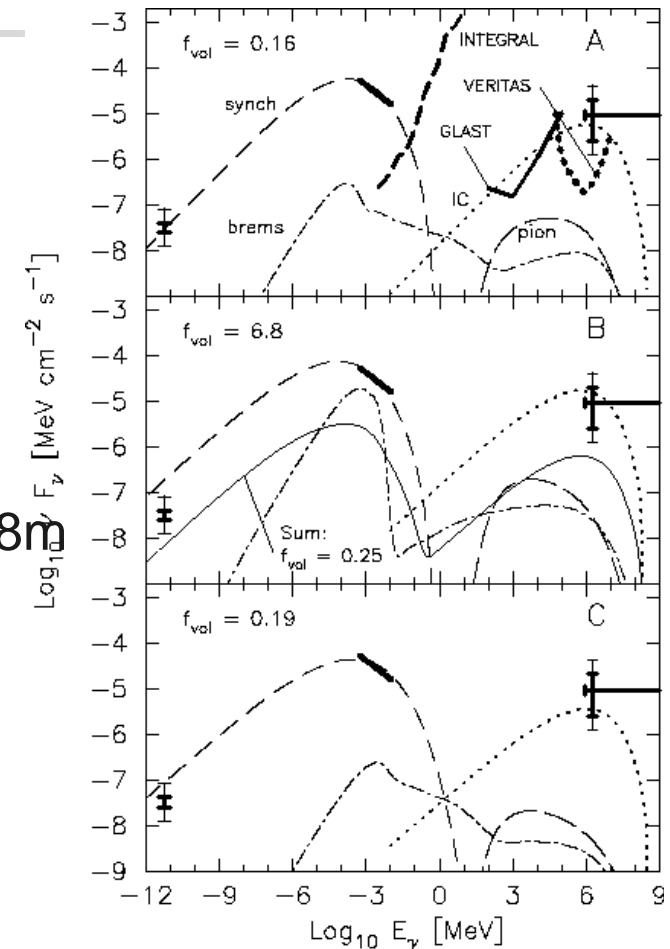
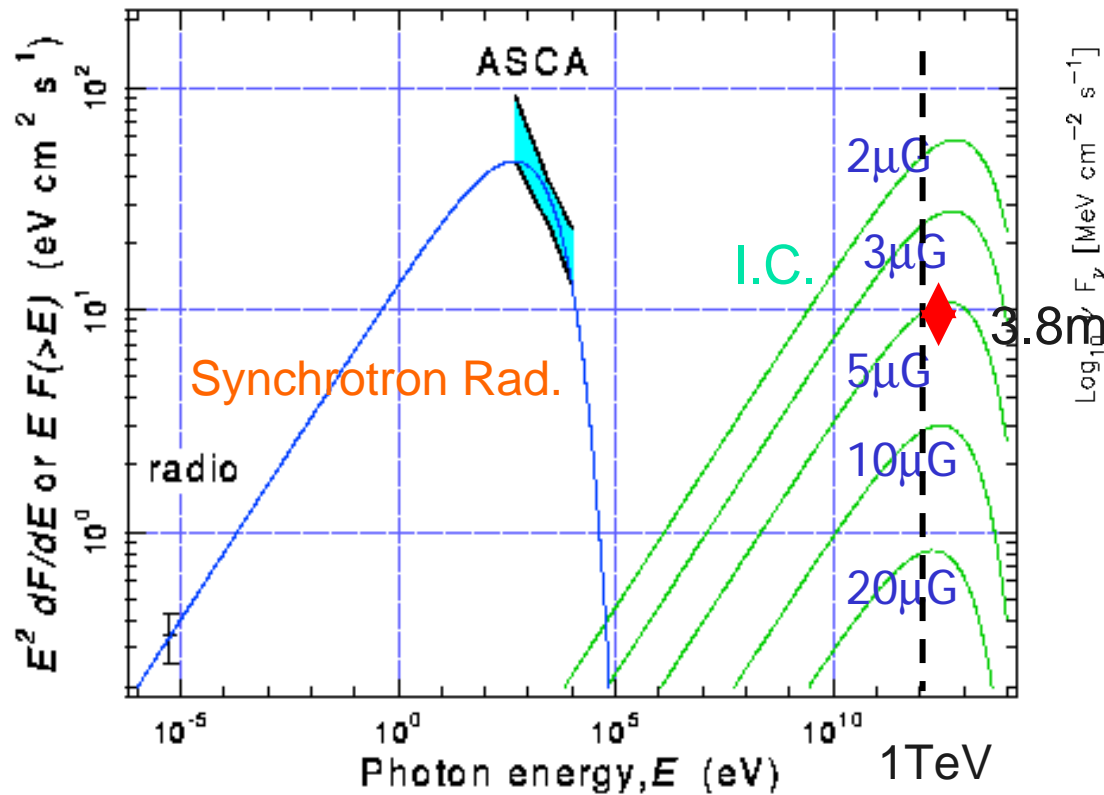
Density in SNR
 $\ll 1 \text{ atom/cm}^3$

Expected TeV γ Rays from Synchrotron-I.C. model



Ellison et al 2001

Naito et al 2001(CANGAROO)



Observation of RXJ1713.7-3946

- 7m ϕ telescope →
- $E_{\gamma} > \sim 1\text{TeV} (E^{-2.5})$
- August 1999,
- 10m ϕ telescope
- $E_{\gamma} > 400\text{GeV} (E^{-2.5})$
- July, August 2000
- On -1419m, Off- 1397m
- Zenith $< 30^{\circ}$ no cloud, dew
- On – 649m, Off - 642m

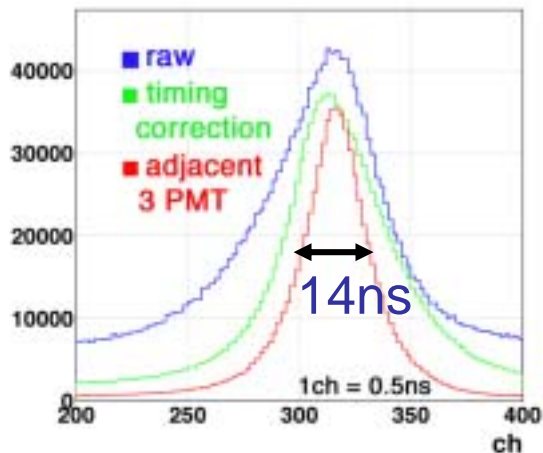
Observation Point

NW rim @ Max. of X-ray(ASCA)

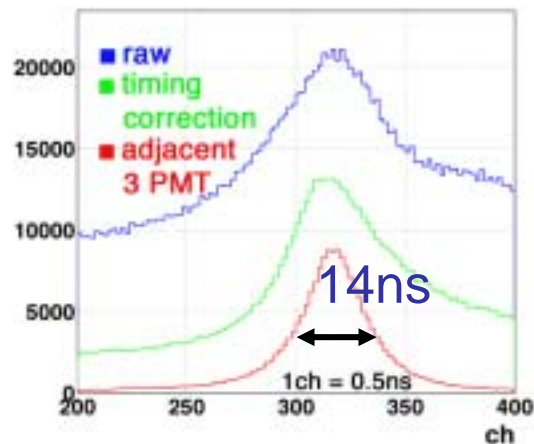
(17h,11m,56,7s $-39^{\circ} 31'52.4''$ (J2000))

Analysis

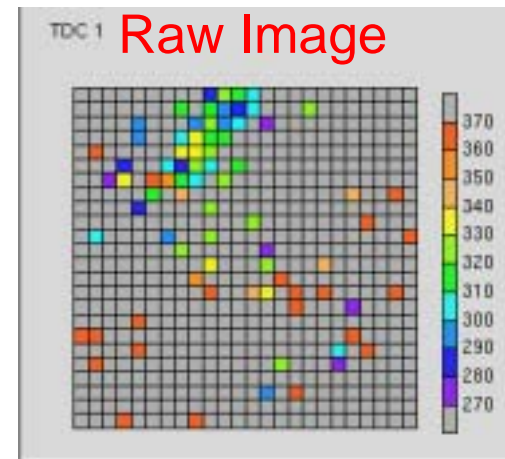
PSR1706OFF



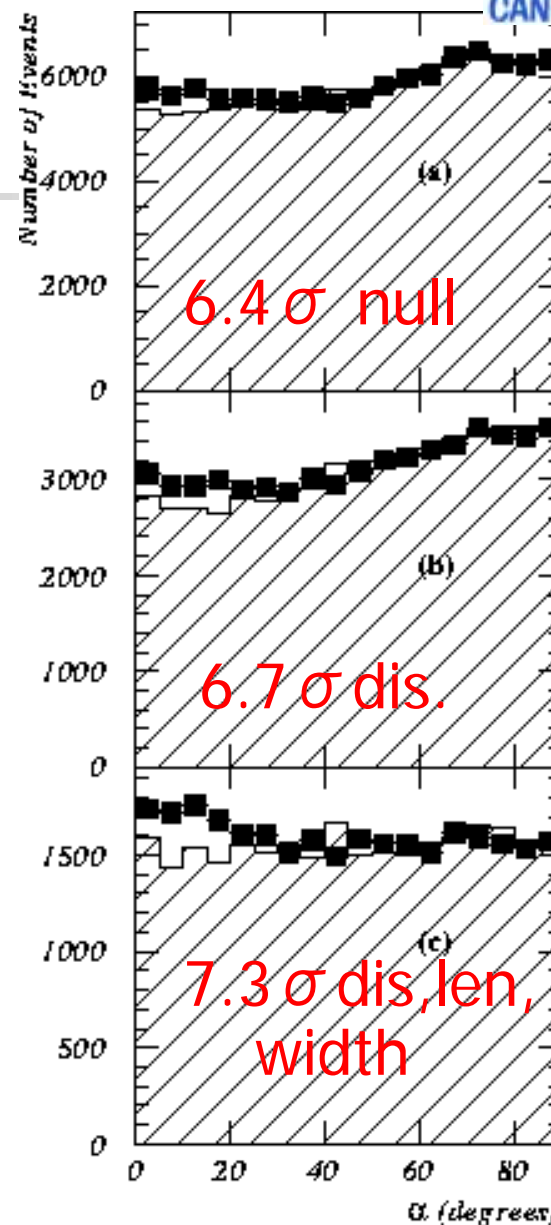
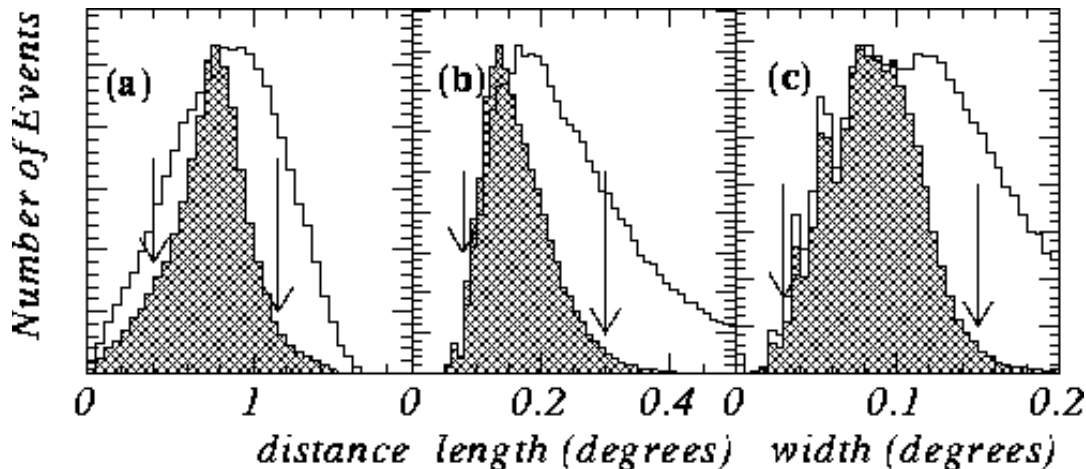
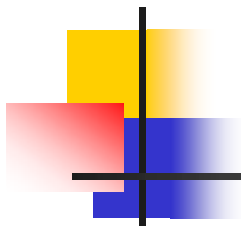
PSR1706ON



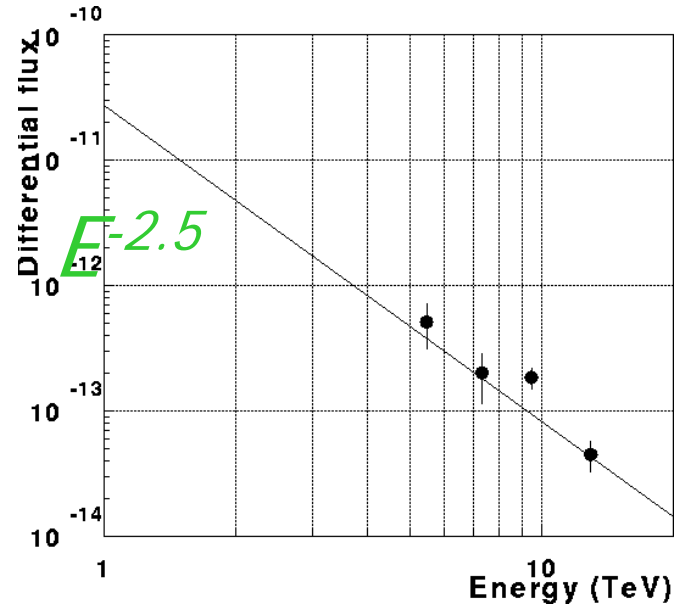
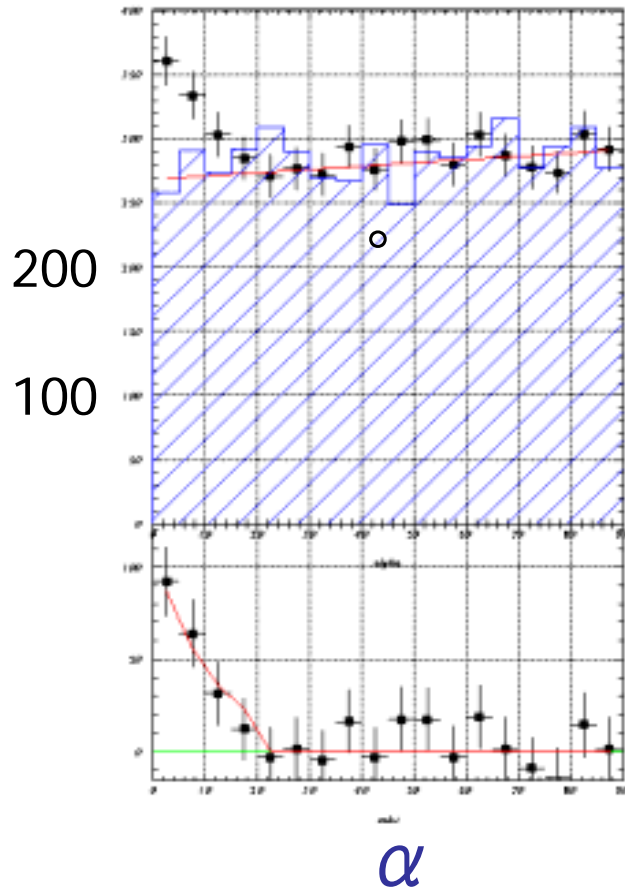
- > 3.3 p.e. for each PMT
- 40 ns timing gate
- 5 adjacent hit PMTs



Imaging Analysis (Conventional Cuts)



Consistency Check using Crab



Crab (~40 hours)

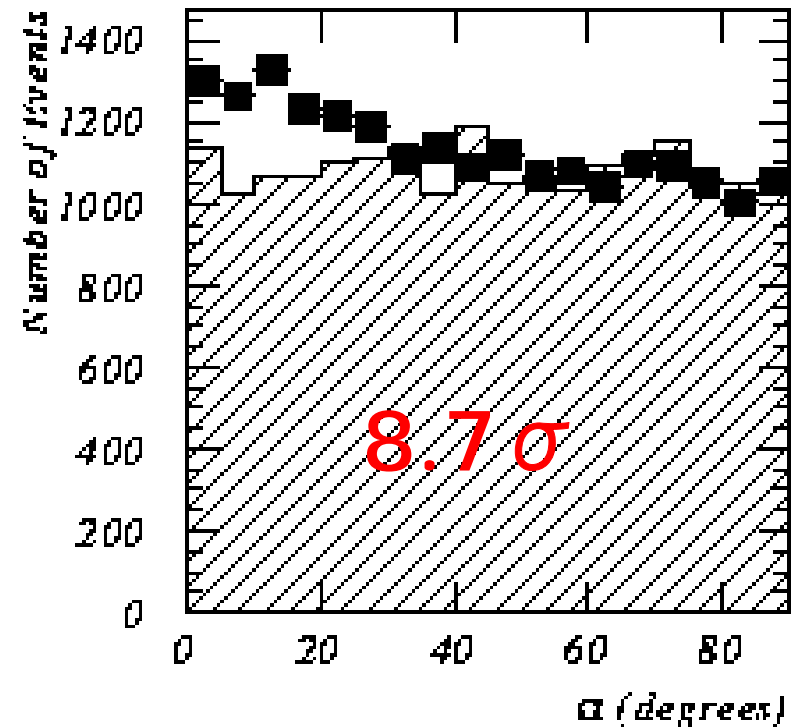
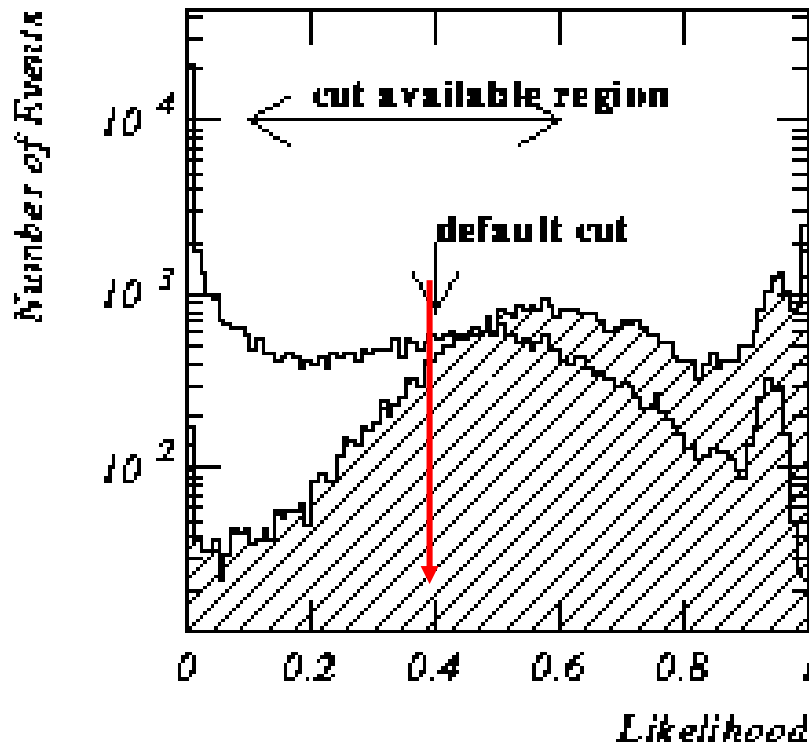
Likelihood method for Imaging

 Simulated gamma rays

 OFF-source

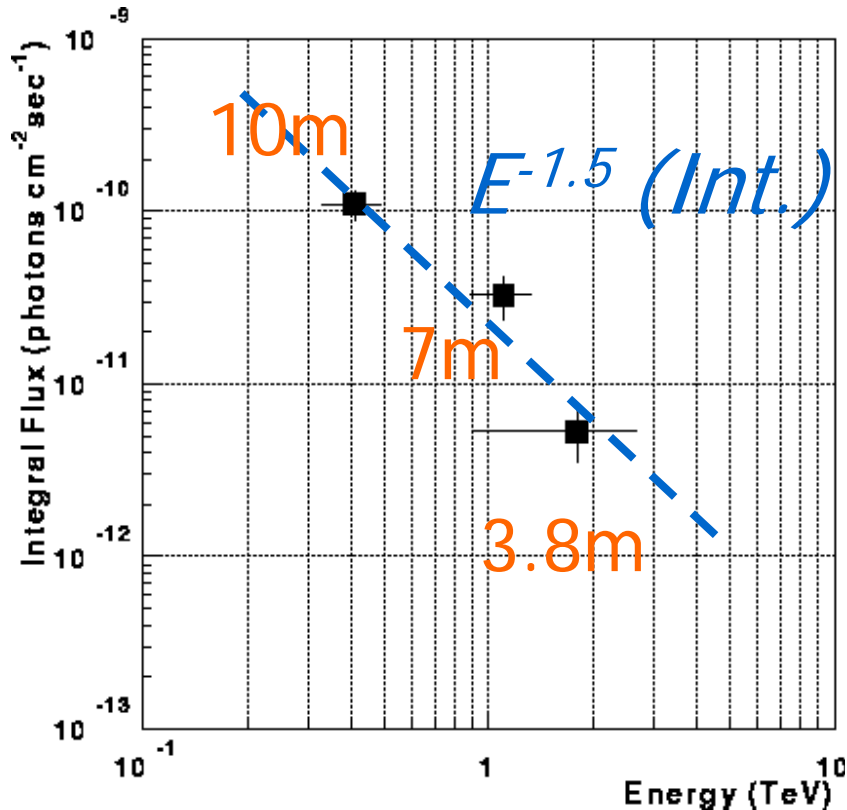
 Off-source

 On-source

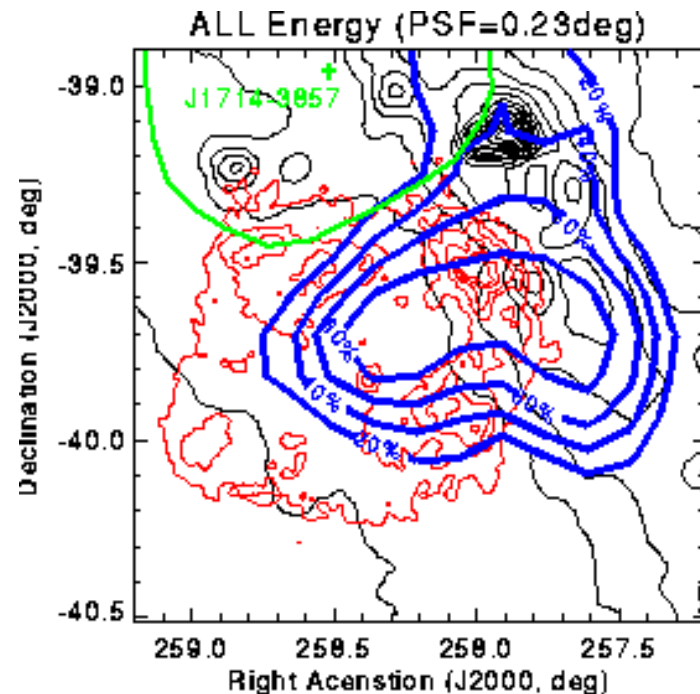


Results of 2000 Observation

Integral fluxes



Significance Map





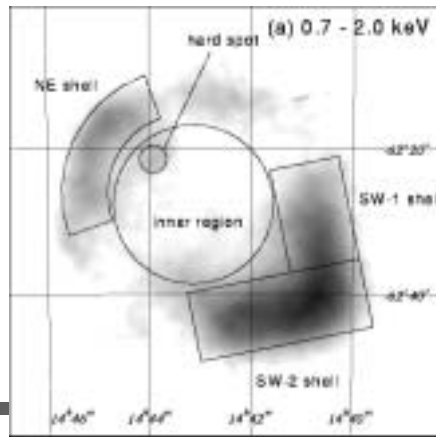
Summary

- Reconfirmation of TeV gamma-ray emission from RXJ1713 with $>8\sigma$ (>400 GeV)
- Integral flux $\sim 1.1 \times 10^{-10} \text{cm}^{-2}\text{s}^{-1}$ ($>400\text{GeV}$) with index of ~ 1.5
- Strongest TeV gamma-ray Source in Southern Hemisphere
- Full data will be soon submitted.

X-ray Synchrotron SNRs

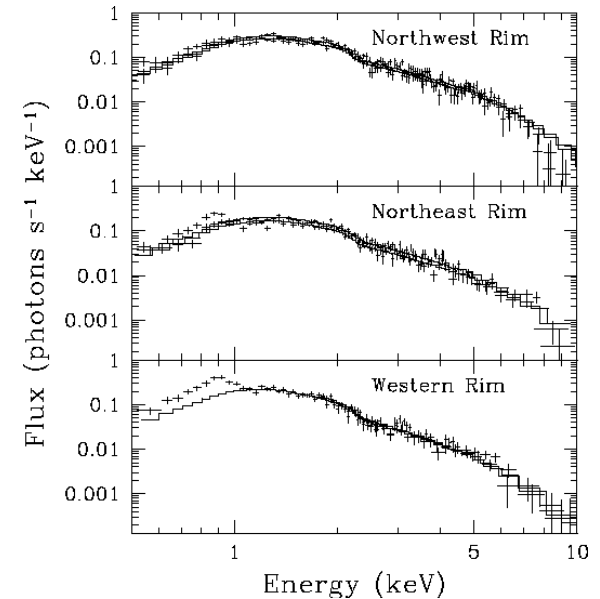
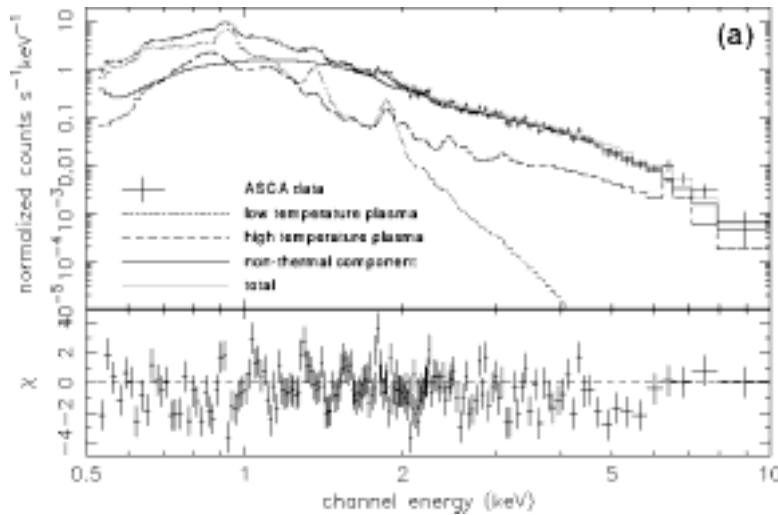
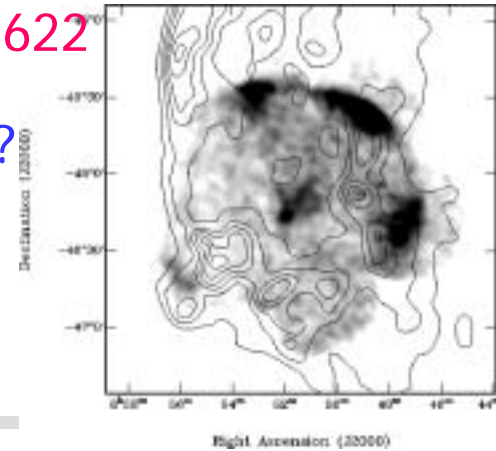
RXW86

Dist. a few Kpc
Type II



RX J0852-4622

Dist > 1kpc?



Bamba et al. 2000 ASCA Results

Slane et al. 2001