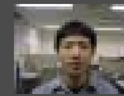
Observation of sub-TeV gamma-rays from RX J0852.0-4622 with CANGAROO-II 10m telescope



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1. Introduction

- The shell type SNR along the line of sight to the Vela SNR.
- Discovered by Rosat all-sky survey(Fig.1)(1).
- Distance < 500pc (2)
- Size ~2^o(20pc)
- On the galactic plane (l,b)=(266.2,-1.2)
- Type II SNR (3)
- Density within SNR $n<2.9\times10^{-2}\ D_1^{-1/2}\ f^{-1/2}$ (4) low => stellar-wind cavity
- Age ~ 1000yr (2)

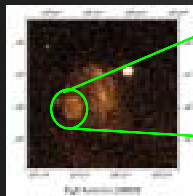

Fig.1 ROSAT all sky survey images of the Vela SNR taken for photon energies 1.4<E<2.0keV.

The image size is $8^o\times8^o$ in equatorial coordinates.

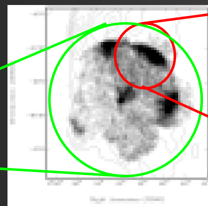

Fig.2 ASCA images

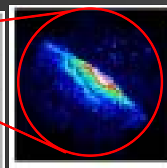

Fig.3 XMM-Newton images of NW rim

Observation with ASCA (4) and XMM-Newton(5).

- NW rim,south rim(Fig.2)
- The spectrum is featureless and well described by a power law(Fig.4).
- => The presence of the accelerated particles is implied.

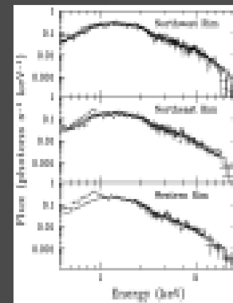

Fig.4 X-ray spectrum by ASCA

The radio observation.

- Weak emission S_ν at 1GHz =47±12Jy =>same as RXJ1713,SN1006.
- Spectral index α=0.40±0.15 =>0.5 is expected by shock acceleration.
- Morphology It seems shell-like but could be unrelated.

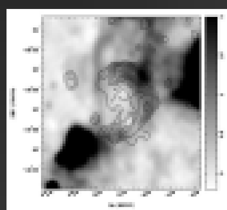

Fig.5 The Parkes 2.42GHz survey image(gray scale) of RX J0852.0-4622 and the ROSAT X-ray image(contour) (6).

CO survey

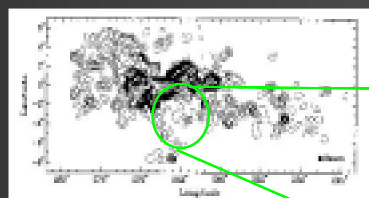

Fig.6 CO integrated intensity map around Vela Molecular ridge taken by the Colombia University 1.2m millimeter-wave telescope(7).

Many molecular clouds are surrounding this SNR.However,it is not clear whether it is interacting with them.

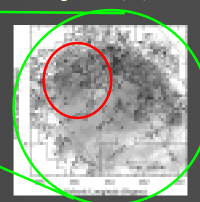

Fig.7 CO integrated intensity map of the Vela SNR taken by NANTEN and soft X-ray image(gray scale) taken by ROSAT (8).The red circle indicates the position of the RX J0852.0-4622.

2.CANGAROO observation

- The point of the maximum X-ray intensity with ASCA (R.A.,Dec.)=(132.25,-45.65)
- Maximum elevation angle 75.45degree
- Observation term From 2001 Dec to2002 Feb Total ON 40h45m OFF 36h12m
- Stars magnitude=4.1 0.65^o distant from the target position =>Its effect must be removed by the analysis.
- Further observation This target is planned to be observed in January 2003.

3.Analysis

At first the data are calibrated using a LED source for the field flattening and the time-walk corrections.Then they are processed with "tna" logic,that is n-adjacent pixels over threshold to remove night sky background.

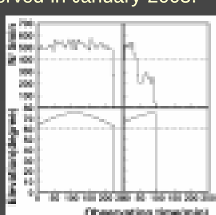

Fig.8

And we select the data taken at high elevation angles(>60^o) in good weather conditions,a total of 35h23m. ON source and 33h26m. OFF source data remained for the further analysis(Fig.8).Then the hot pixels effected by the stars and electrical noise are removed.

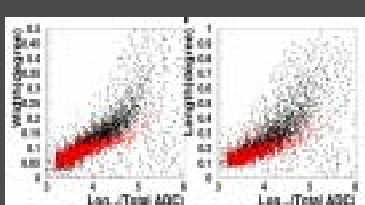

Fig.9

After these pre-selection,we carried out a shower image analysis using the standard set of image parameters , distance , length , width(Fig.9) , and α ,combining length and width to assign likelihoods to each events. The following is the definition of the likelihood ratio and Fig.10 shows its distribution.

$$L \equiv \frac{\mathrm{Prob}(\gamma)}{\mathrm{Prob}(\gamma)+\mathrm{Prob}(p)}$$

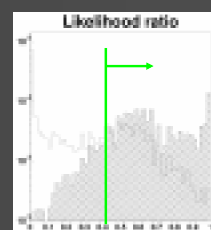

Fig.10

After these selection,the resulting α distribution is shown in Fig.11(preliminary).

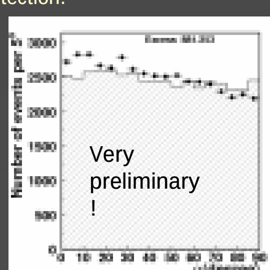

Fig.11

4.Discussion

Figure 12 is the multi-wavelength spectrum.The solid line is estimated by the model of the inverse Compton scattering of electrons.This leads to the expectation of the CANGAROO detection.

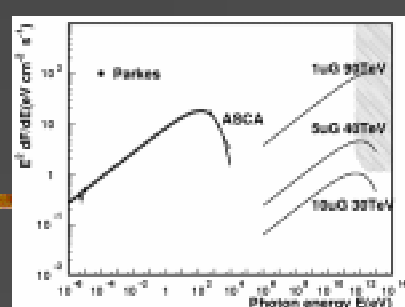

Fig.12

5.reference

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