Gamma-ray detection of newly discovered Ancora supernova remnant: G288.8–6.3

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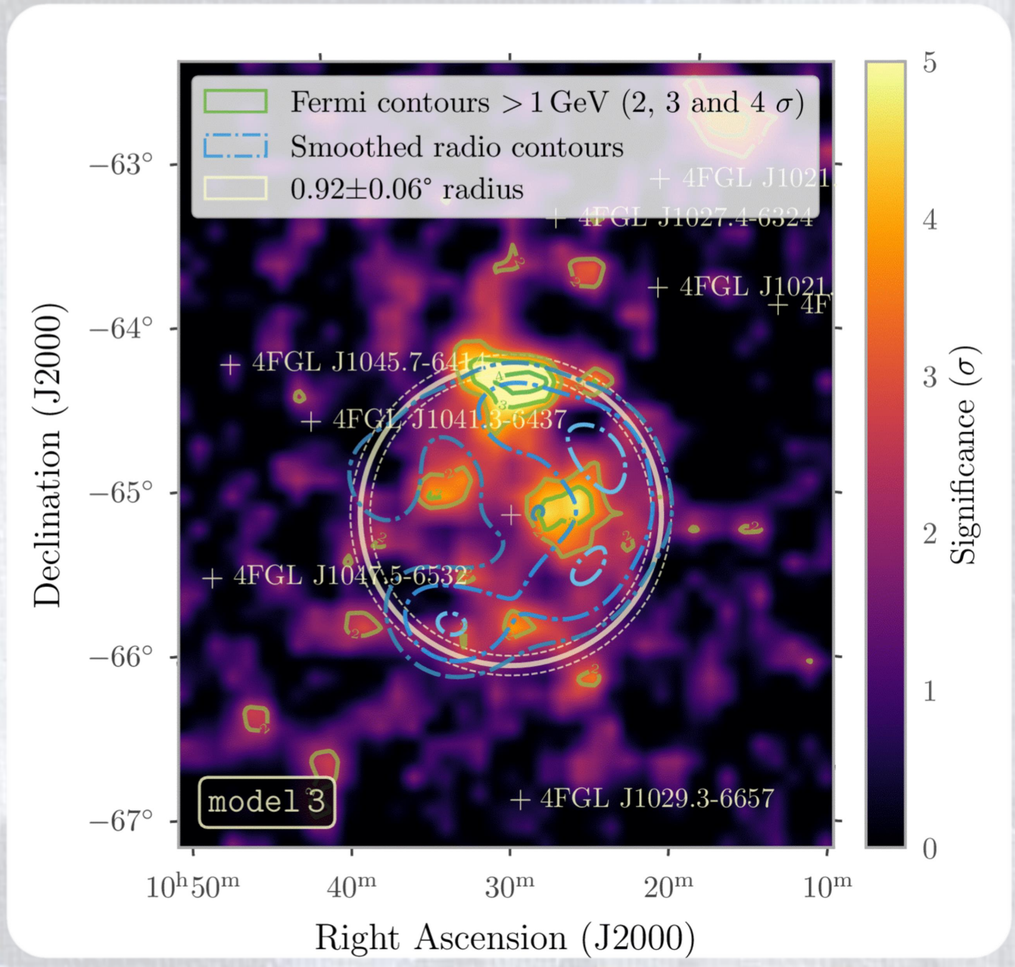
Context. The supernova remnant (SNR) G288.8–6.3 was recently discovered as a faint radio shell at high Galactic latitude using observations with the Australian Square Kilometre Array Pathfinder (ASKAP) in the Evolutionary Map of the Universe (EMU) survey.

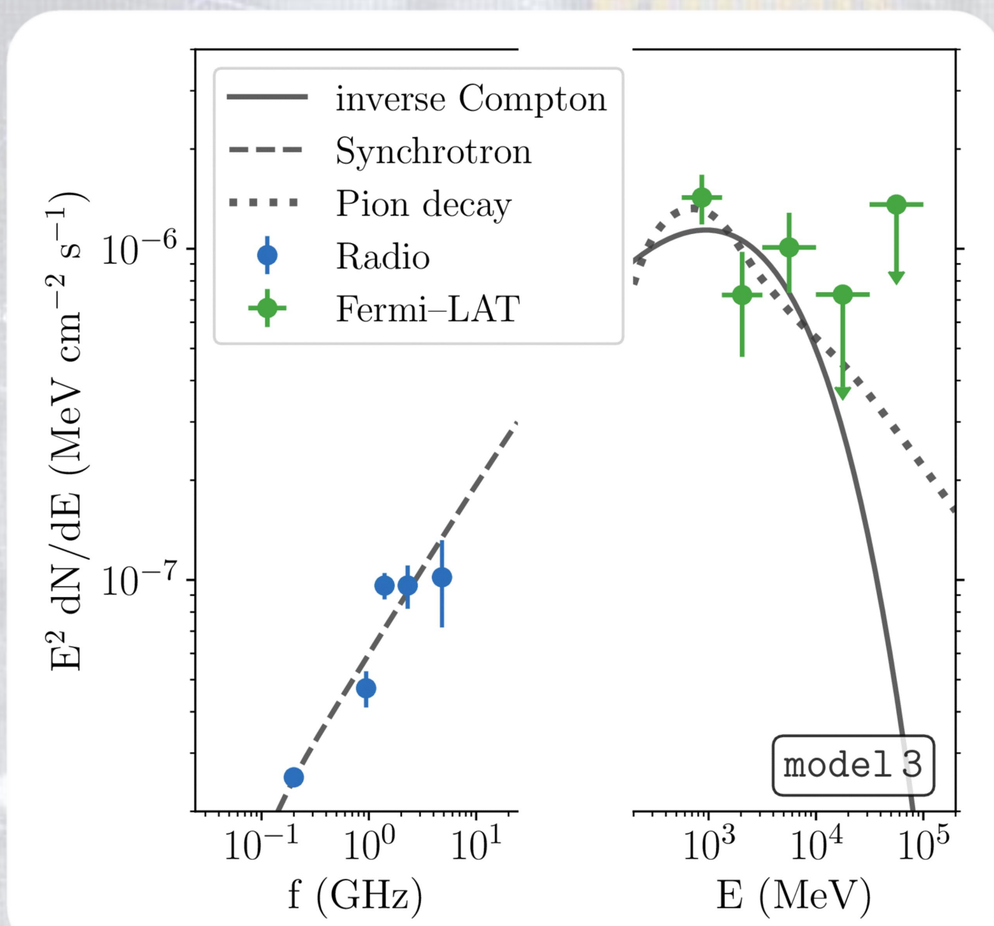
Aims. We performed the first detailed investigation of the γ-ray emission from the G288.8–6.3 region, aiming to characterise the high-energy emission in the GeV regime from the newly discovered SNR, dubbed Ancora.

Methods. Fifteen years of *Fermi*-Large Area Telescope (LAT) data were analysed at energies between 400 MeV and 1 TeV, and the excess seen in the region was modelled using different spatial and spectral models.

Results. We detect spatially extended γ-ray emission coinciding with the radio SNR, with detection significance up to 8.8 σ. A radial disk spatial model in combination with a power-law spectral model with an energy flux of $(4.80 \pm 0.91) \times 10^{-6}$ MeV cm^{-2} s^{-1}, with the spectrum extending up to around 5 GeV was found to be the preferred model. Morphologically, hotspots seen above 1 GeV are well correlated with the bright western part of the radio shell.

Conclusions. Ancora is the seventh confirmed SNR detected at high Galactic latitude with *Fermi*-LAT. The study of this new population of remnants can provide insights into the evolutionary aspects of SNRs and their properties, and further advance efforts of constraining the physics of particle diffusion and escape from SNRs into the Galaxy.





Source name	Extension (deg)	Energy flux (MeV cm^{-2} s^{-1}) 1 GeV–1 TeV	Photon spectral index –	Reference
Ancora SNR/G288.8–6.3	0.92	$(3.29 \pm 0.78) \times 10^{-6(\perp)}$	$2.31 \pm 0.11^{(\perp)}$	This work
G150+4.5	1.5	$5.20 \times 10^{-5(*)}$	$1.62 \pm 0.04_{\rm stat} \pm 0.22_{\rm sys}{}^{(\dagger)}$	Devin et al. (2020)
G17.8+16.7/ FHES J1723.5–0501	0.73	$(1.38 \pm 0.26) \times 10^{-5(\triangledown)}$	$1.83 \pm 0.02_{\rm stat} \pm 0.05_{\rm sys}$ $1.97 \pm 0.08_{\rm stat} \pm 0.06_{\rm sys}$	Araya et al. (2022) Ackermann et al. (2018)
G296.5+10.0/FHES J1208.7–5229	0.7	$8.17 \times 10^{-6(**)}$ $(1.13 \pm 0.24) \times 10^{-5(\triangledown)}$	1.85 ± 0.13 $1.81 \pm 0.09_{\rm stat} \pm 0.05_{\rm sys}$	Araya (2013) Ackermann et al. (2018)
SN 1006/G327.6+14.6	0.1	$(3.63 \pm 1.62) \times 10^{-6(\dagger\dagger)}$	1.57 ± 0.11	Condon et al. (2017)
Calvera SNR/G118.4+37.0	0.53	$3.06 \times 10^{-6(\triangledown\triangledown)}$	$1.66 \pm 0.10_{\rm stat} \pm 0.03_{\rm sys}$	Araya (2023)
G166+4.3	~0.3	$2.87 \times 10^{-6(**)}$	2.7 ± 0.1	Araya (2013)

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