Astrophysics > High Energy Astrophysical Phenomena

Nuclear de-excitation line spectrum of Cassiopeia A

A. Summa, D. Elsaesser, K. Mannheim

(Submitted on 21 Jul 2011)

The supernova remnant Cassiopeia A is a prime candidate for accelerating cosmic ray protons and ions. Gamma rays have been observed at GeV and TeV energies, which indicates hadronic interactions, but they could also be caused by inverse-Compton scattering of low-energy photons by accelerated electrons. We seek to predict the flux of nuclear de-excitation lines from Cas A through lower-energy cosmic rays and to compare it with COMPTEL measurements. Assuming a hadronic origin of the high-energy emission, we extrapolate the cosmic ray spectrum down to energies of 10 MeV, taking into account an equilibrium power-law momentum spectrum with a constant slope. We then calculate the nuclear line spectrum of Cassiopeia A, considering the most prominent chemical elements in the MeV band and their abundances as determined by X-ray spectroscopy. We show that the predicted line spectrum is close to the level of the COMPTEL sensitivity and agrees with conservative upper limits.

Comments:	4 pages, 1 figure, accepted for publication by A&A
Subjects:	**High Energy Astrophysical Phenomena (astro-ph.HE)**
Journal reference:	A&A 533, A13 (2011)
DOI:	10.1051/0004-6361/201117267
Cite as:	**arXiv:1107.4331 [astro-ph.HE]**
	(or **arXiv:1107.4331v1 [astro-ph.HE]** for this version)

Submission history

From: Alexander Summa [view email]
[v1] Thu, 21 Jul 2011 18:19:23 GMT (151kb)

Which authors of this paper are endorsers?