

Observational evidence of cosmic rays from the Cat's Eye planetary nebula NGC 6543

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We address a mechanism whereby cosmic rays are launched from sources in our Galaxy, subsequently to be accelerated to the highest energies by encounters with Galactic magnetic fields. It is generally thought that planetary nebulae do not emit cosmic rays, but we show observational evidence that NGC 6543 has been emitting a jet of cosmic rays beginning $\sim 80,000$ years ago. The "telescope" that provided these observational data is most unusual — an ice core. The 250,000-year record of the flux of cosmic rays from the GRIP ice core program archives shows that the Earth encountered a jet of cosmic rays from a point source. The record also shows evidence of a significant magnetic field associated with the jet. We derived the probable location of that source to be $+65^\circ \pm 10^\circ$, $19\text{h} \pm 1\text{h}$. Within that circle is the Cat's Eye, NGC 6543, the only nearby active object at a distance of ~ 1000 pc. The expansion velocity of the nebula and the 400 asec diameter of the outer fringe indicates the activity began 80,000 years ago, thereby confirming this identification. We will cite further evidence pointing toward the central star being a close binary probably consisting of a compact object and accretion disc fed by plasma torn from an aging giant star. If all planetary nebulae pass through this same stage they would provide a significant source of cosmic rays.