# X-Ray Emission from Supernova Remnants

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During the ROSAT all-sky survey and a series of pointed observations X-ray emission has been detected from $\sim$ 102 galactic remnants out of the 182 radio remnants known before ROSAT. More than 400 new extended X-ray sources have been discovered at low galactic latitude to be checked for an SNR origin. Radio and optical follow-up observations have started to confirm the ROSAT discoveries of G13.3-1.3, G28.8+1.5, G32.1-0.9, G156.2+5.7 (the first ever SNR discovered by its X-ray emission), G189.6+3.3, G272.2-3.2, G299.2-2.9, G347.5-0.5. Some of the SNR candidate sources turned out to be low latitude clusters of galaxies. Many of the remnants unexpectedly appear to be associated with HII regions.

One highlight of more than 7 years ROSAT observations is the discovery of fragments of the Vela SNR progenitor star outside the SNR boundary. Observations with ASCA indicate over-abundance of Si, Mg and Ne in the fragments, although not consistenly for all three elements in one fragment. Symmetry considerations of the emission trailing the fragments' heads and the circularity of the ROSAT determined SNR boundary together with the proper motion of the pulsar led to a revised age estimate of the SNR, about 2 to 3 times greater than the characteristic spin down age of the pulsar. The greater age leads to a significantly lower mean speed of the fragments to reach their current position, which is consistent with the moderate explosion velocity of high Z material predicted by type II and type Ib supernova models.

Studies of the spatial and thermal structure show that many remnants tend to be dominated by patchy emission with almost no temperature variations across, favouring models of evaporating clouds, e.g. for HB9, HB21, G18.95-1.1. They appear to mimick center-filled remnants, but they are thermal SNRs and no plerions. The best-fit models indicate the mass in these clouds to be much greater than of the intercloud matter, and the clouds are not destroyed by the passing and heating of the blast wave.

ROSAT observations assisted ASCA to identify shell-type remnants which show non-thermal X-ray emission, i.e. SN 1006 and RX 1713.7-3946. This may be the first direct evidence of cosmic acceleration up to 100 TeV across the SNR shock boundary.

The monitoring of the X-ray light curve of SN 1987 A has been continued since the discovery of soft X-rays by ROSAT on about day 1200. The X-ray flux is steadily increasing in an almost linear fashion. In February 1997 an energy spectrum was taken with the re-installed PSPC. Within the statistics the spectrum is still soft and it has not changed compared with the latest spectrum of September 1993.