SHOCKS AND PARTICLE ACCELERATION IN SNRS: OBSERVATIONAL FEATURES

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The last 10 years a number of observational advances have substantially increased our knowledge of shock phenomena in supernova remnants. It has become clear that some supernova remnants have hard X-ray emission, which is either caused by synchrotron radiation from ultra-relativistic electrons ($E > 10$ TeV), or alternatively from mildly energetic electrons which have been accelerated from the pool of thermal electrons. Synchrotron emission is the most likely explanation for e.g. SN1006 and RX J1713.7-3946, whereas the latter mechanism has been proposed for the hard X-ray emission from e.g. Cas A and RCW 86.

These new insights have some less pleasant consequences. We can no longer derive shock velocities from plasma temperatures, and abundance measurements are more difficult if we are no longer sure what the dominant X-ray continuum mechanism is.

In this review I will discuss these topics and relate it to the issues of collisionless shock heating, electron acceleration and cosmic ray injection in supernova remnants. The emphasis will be on X-ray observations, with material drawn from the recent literature and from propriety XMM-Newton and BeppoSAX observations of Cas A, RCW 86 and SN 1006.