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Title: X-ray Observations of Cosmic Ray Acceleration

Abstract: Since the discovery of cosmic rays, detection of their sources has remained elusive. A major breakthrough has come through the identification of synchrotron X-rays from the shocks of supernova remnants through imaging and spectroscopic observations by the most recent generation of X-ray observatories. This radiation is most likely produced by electrons accelerated to relativistic energy, and thus has offered the first, albeit indirect, observational evidence that diffusive shock acceleration in supernova remnants produces cosmic rays to TeV energies, possibly as high as the “knee” in the cosmic ray spectrum. X-ray observations have provided information about the maximum energy to which these shocks accelerate electrons, as well as indirect evidence of proton acceleration. Shock morphologies measured in X-rays have indicated that a substantial fraction of the shock energy can be diverted into particle acceleration. This presentation will summarize what we have learned about cosmic ray acceleration from X-ray observations of supernova remnants over the past two decades.