

Electron spectrum inferred from synchrotron emission in supernova remnants

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It is most probable that high energy cosmic ray electrons in the Galaxy are produced in supernova remnants(SNRs), and some information about electron spectrum in SNRs have been provided in the form of the synchrotron radiation data. Those data from radio to X-ray emissions obtained partially suggest that the electron spectrum is a power-law shape with a cutoff and we have to infer the break energy and the spectral shape above it. The break point between radio and X-ray emission in shell-type SNRs is extremely important because it shows the upper limit of observed electron spectrum in the Galaxy.

We show the analytical method for estimating the electron spectrum from the synchrotron radiation. The electron power-law spectrum with three types of cutoff, namely, with exponential cutoff, step-function cutoff and power-law index change are calculated and the differences between them are represented by analytical terms. We precisely investigate these terms and discuss the possibility of observation of the differences.