Contribution ID: **26** Type: **Oral Talk**

Non-Thermal Emission and Electron Acceleration in Young Supernovae

Tuesday, 23 April 2013 14:00 (40 minutes)

While radiation signals from extragalactic young supernovae (within about a year after the explosion) are mostly emitted in optical and near-infrared, some of them are also non-thermal emitters in radio and X-ray. The non-thermal signal comes from the hydrodynamic interaction between the expanding supernova (SN) ejecta and circumstellar materials (CSM), and has been found to be useful to probe the CSM properties. In this talk, I discuss another aspect –how this is useful also for studying the electron acceleration mechanism at a strong shock wave. An emphasis is placed on the physical condition difference in young SNe and SN remnants (SN), especially highlighted by a potential to derive information (e.g., acceleration efficiency, energy distribution) on low energy electrons before being accelerated by a standard diffusive shock acceleration mechanism.

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