

[초IT-02] New challenges to stellar evolution theory from supernovae

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Despite the great success that stellar evolution theory have enjoyed during the last 50 years, new challenges are emerging with recent observations of supernovae: many aspects of supernovae cannot be easily explained by the standard scenarios on supernova progenitors. A few examples include the red supergiant problem – the dearth of Type IIP supernova progenitors with masses higher than about 16 Msun, the non-detection of Type Ib/c supernova progenitors despite very deep searches in pre-supernova optical images, the unexpected blue colors of some Type IIn supernova progenitors, and the exotic stellar explosions of both ultra-faint and super-luminous types that have been only recently discovered.

By confronting these observations with new stellar evolution models, we are making significant progress in better understanding the role of metallicity, rotation and binary interactions for the pre-supernova evolution of massive stars. In this talk, I will give a brief review on the recent observational constraints on supernova progenitors and a progress report on several research projects that deal with pair-instability supernovae from the local Universe, type Ib/c supernovae from massive binary systems, and some peculiar stellar explosions like SN2012Z.