Supernovae at the Highest Angular Resolution

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The study of supernovae (SNe) and their environments in host galaxies at the highest possible angular resolution in a number of wavelength regimes is providing vital clues to the nature of their progenitor stars. We are observing SNe in the radio using the VLA and VLBI and in the X-rays using *Chandra*, to probe the density and structure of the circumstellar environment and, by inference, the evolution of the presupernova stellar wind, revealing the last stages of stellar evolution of the SN progenitor prior to explosion. We will discuss some examples, including exciting recent combined radio/X-ray results for SNe 1999em in NGC 1637 and 1998S in NGC 3877. We are also studying SNe and their local stellar and gaseous environments with the subarcsecond resolution of *HST*. The *HST* resolution has allowed us to detect late-time optical emission from SNe. For the first time, we can also resolve individual stars in, and to derive detailed color-magnitude diagrams for, several environments. As a result, we are able to place rigorous constraints on the masses of the SN progenitors. In particular, we highlight the results for the Type II SNe 1979C in M100 and 1997bs in M66 (for which we may have directly identified the progenitor star).

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