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Core-Collapse Supernovae – the Outliers[1]

STAN WOOSLEY, UCSC - Dept Astronomy

After a brief review of current efforts to model the explosion mechanism for "ordinary," core collapse supernovae and the neutrino signal expected from them, some of the outliers predicted by current theory will be discussed. Chief among these are the pulsational-pair instability supernovae, which can occur for stars as light as 80 solar masses or as heavy as 140 solar masses, or more. These explosions, which would have been common in the early universe and persist today, can make supernovae that do or do not recur, and that can be either exceptionally faint or bright or both. They leave behind black holes with masses near 40 solar masses, and produce an abundance pattern that is rich in CNO, much like that seen in the ultra-iron poor stars. Other models for unusual supernovae, including magnetar-powered supernovae and 8 - 10 solar mass supernovae will be mentioned as time allows.

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