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Massive Stars: Input Nuclear Physics and Stellar Models

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Stars with masses greater than about twelve times the mass of our Sun play a crucial role in astrophysics, especially in the evolution of galaxies and the growth of the abundances of the chemical elements. I present a general overview of the structure and evolution of such stars, particularly during their pre-supernova stages. I discuss some of the many physical uncertainties still encountered in modeling massive star evolution. These uncertainties include the effects of mass loss, convection, rotation, and initial metallicity. I pay particular attention to the role of some key nuclear reactions and the effects of uncertainties in the rates for these reactions. Finally, I discuss some details of the massive-star nucleosynthesis of the s-process and of two key nuclei observable by gamma-ray telescopes, namely, aluminum-26 and iron-60.