

First Star Formation

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The appearance of the first stars marked a primary transition in cosmic history. Their light ended the so-called dark ages, and they played a key role in the metal enrichment and the reionization of the Universe, thereby shaping the galaxies we see today. From detailed observations in the Milky Way and nearby galaxies we know that stars and star clusters form by gravitational collapse in regions of high density in the multi-phase interstellar medium. The process of stellar birth is controlled by the intricate interplay between the self-gravity of the star-forming gas and various opposing agents, such as supersonic turbulence, magnetic fields, radiation pressure, and gas pressure. Turbulence plays a dual role. On global scales it provides support, while at the same time it can promote local collapse. This process is modified by the thermodynamic response of the gas, which is determined by the balance between various heating and cooling processes, which in turn depend on the chemical composition of the material. I will argue that primordial star formation is subject to very similar complexity and review the current status of the field, in particular I will speculate about the mass spectrum of the first population of stars.