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The effects of primordial chemistry and streaming velocities on Pop III star formation

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It is widely accepted that during the cosmic evolution three stellar populations can be differentiated. The earliest stars, referred to as Pop III stars, form at redshifts (z) between 20 and 30. For those stars molecular hydrogen is dominant cooling agent within the proto-stellar clouds typically leading to giant stars with masses on the order of 100 Msun. These stars die quickly via supernovae events, polluting their local environment with metals, which speeds up gas cooling, leading to the formation of Pop II and Pop I stars. A second factor involved in the formation of the first stars is the effect of the decoupling of the photons and baryonic matter at z ˜ 1020. This decoupling sets up a relative velocity between the dark matter and baryonic matter of ˜ 30 km/s. Both processes have an impact on the formation time of the first stars, thereby altering the re-ionisation history of the Universe which will be observed by the SKA radio telescope. I will discuss the modeling of these two processes by state-of-the-art hydrodynamical simulations and the model predictions for future observations of the re-ionisation history of the Universe with the SKA.

Summary

Discussion of the modeling of Pop III stars employing state-of-the-art hydrodynamical simulation techniques. Model predictions for future observations of the re-ionisation history of the Universe with the SKA.

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