X04a The Formation of Pop III Star Clusters under UV radiation

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The first stars, the "culprits" for the vanishing of the dark universe, are believed to have emerged in minihaloes of masses $\sim 10^6\ M_\odot$, when the Universe was a relatively simple environment. With their birth, life, and death, their influence manifests as radiation feedback(internal and external), supernovae explosions, dynamical, and metal enrichment, among many more. This work aims to look into star formation, and related processes to galaxy formation, under a low-moderate external feedback. The Lyman-Werner(LW) radiation is responsible for destroying the hydrogen molecules, which are crucial for an efficient cooling in the early Universe, thus affecting directly star formation. The smoothed particle hydrodynamic (SPH)/N-body code GADGET-3 is used to conduct the simulations, with a spatial resolution of $\sim 40 - 50$ comoving pc, SPH particle mass $\sim 12\ h^{-1}M_\odot$, and dark matter particle mass $\sim 67\ h^{-1}M_\odot$, of halo masses of $\sim 10^8\ h^{-1}M_\odot$. The conducted simulations resolve minihaloes and follow galaxy formation until redshift z = 9, in which different values of LW radiation are implemented. The relation between star formation, collapsing halo mass and UV strength is investigated. Results reveal that star formation is more effectively suppressed when radiation is stronger, accumulating more mass while delaying the collapse, and leading to the formation of larger and more concentrated structures. The collapsing mass increases with the UV background. If the physical quantities are of values within the observability limitations of current and future missions, then these structures and scenarios might provide a fairly good interpretation of what will be witnessed.