X01a The Formation of Pop III Star Clusters under UV radiation

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In the primordial mists of the simplest elements, gas is found to be falling into the gravitational potential wells of dark matter (DM) and accumulating. Eventually, at redshifts $z \sim 10 - 30$, in minihaloes of masses $M \sim 10^5 - 10^6 \mathrm{M}_\odot$, the first stars (Pop III stars) are expected to form. 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. To perform our simulations we use the smoothed particle hydrodynamic N-body/SPH code GADGET-3 and reach a spatial resolution of ~ 42 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 $\sim 10^8\ h^{-1}M_\odot$. We resolve minihaloes and follow galaxy formation until redshift z = 9, in which different values of LW radiation are implemented. We perform two dark matter simulations with different initial conditions and select five haloes to import among them for the zoom-in simulations with resolution $(4096)^3$. 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.