Title:	Modeling the Survival of Population III Stars to the Present Day
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Abstract:	Recent numerical simulations have suggested the probability of a fraction of the primordial stars being ejected from the cluster of their origin. We explore the possibility that some of these can remain on the main sequence until the present epoch. We develop a semianalytical model guided by results of cosmological simulations to study the mass accretion by these protostars as a function of the original stellar mass and other parameters such as angular momentum and gravitational drag due to ambient gas. We also explore whether some of the protostars remain sufficiently low mass and long-lived to survive to the present day. This requires that the protostars are ejected from the star-forming region while their mass is less than 0.8 M⊙. Assuming that the protostars gain mass via the spherical Bondi-Hoyle accretion from the ambient medium, we show that Population III protostars that initially form within a certain range of mass and are ejected with velocity larger than the escape velocity may survive to the present day on the main sequence. Thus, they may even be found in our Milky Way or its satellites. Our calculations also reveal that protostars that do not get ejected from the parent gas clump accrete a large amount of gas. We predict that these can become massive enough to be progenitors of black holes.
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