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**The $^{7}$Be$(\alpha,\gamma)^{11}$C Reaction Rate and Its Contribution to the Evolution of Population-III Stars** ERIC ABOUD, Texas AM University — In the early stages of their lives, zero-metallicity stars undergo the proton-proton process until enough $^{12}$C is produced to start the CNO cycle. Due to the high energies needed for the main $^{12}$C production method (triple $\alpha$ process), low-mass main-sequence stars may not produce $^{12}$C before they collapse. The theoretical hot proton-proton chain may provide an alternate method through reaction chains. The specific chain of interest is the $^{7}$Be$(\alpha,\gamma)^{11}$C(p,$\gamma$)$^{12}$N$(\beta^{+},\nu)^{12}$C reaction chain. Theoretical studies have hinted at the large contribution of the sub-alpha threshold state in $^{11}$C to the reaction rate. A detailed study of the $^{7}$Be$(\alpha,\gamma)^{11}$C reaction rate, using the analog $^{7}$Be($^{6}$Li,$d\gamma$)$^{11}$C transfer reaction, is being performed. The present work aims to experimentally determine the contribution of the sub-alpha threshold state to the reaction rate for the first time.

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