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Impact of ^{16}O$(e,e'\alpha)^{12}$C and ^{16}O$(\gamma,\alpha)^{12}$C measurements on the ^{12}C$(\alpha,\gamma)^{16}$O astrophysical reaction rate[1] ROY HOLT, Argonne National Laboratory, California Institute of Technology, BRADLEY FILIPPONE, California Institute of Technology, STEVEN PIEPER, Argonne National Laboratory — The ^{12}C$(\alpha,\gamma)^{16}$O reaction, an important component of stellar helium burning, plays a key role in nuclear astrophysics. Providing a reliable estimate for the energy dependence of this reaction at stellar helium burning temperatures has been a major goal for the field. In this work, we study the role of potential new measurements of the inverse reactions, ^{16}O$(e,e'\alpha)^{12}$C and ^{16}O$(\gamma,\alpha)^{12}$C, in reducing the overall uncertainty. A multilevel R-matrix analysis is used to make extrapolations of the astrophysical S factor for this reaction to the stellar energy of 300 keV. The statistical precision of the S-factor extrapolation is determined by performing multiple fits to existing $E1$ and $E2$ ground state capture data, including the impact of possible future measurements of the ^{16}O$(e,e'\alpha)^{12}$C and ^{16}O$(\gamma,\alpha)^{12}$C reactions. In particular, we consider a proposed MIT experiment that will make use of a high-intensity low-energy electron beam that impinges on a windowless oxygen gas target and a proposed Jefferson Lab experiment that will make use of bremsstrahlung and a bubble chamber in order to measure the total cross section for the inverse reaction.

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