## Carbon burning in stars: An experimental study of the 12C+12C reactions towards astrophysical energies

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12C+12C reactions are among the most important processes in the evolution and nucleosynthesis of massive stars. The measurement of these reactions at astrophysical energies is very challenging due to their extremely small cross sections, heavy resonant structure and the presence of natural hydrogen and deuterium contaminants in the carbon targets. To date, no measurement of the 12C+12C reactions has been possible at energies below Ecm=2.14MeV. In addition, measurements at Ecm<3.0MeV present large uncertainties due to the target H contamination. In this work, the measurement of the 12C+12C reactions at Ecm=2.52-4.30MeV was performed using the CIRCE accelerator in Caserta, Italy. We used the dE-Erest particle identification technique to unequivocally identify protons and alpha particles. The 12C+12C reactions cross sections and S-factors were extracted from the thick target yield. The experimental results as well as their impact on the determination of the stellar rate of 12C+12C fusion reactions are discussed.

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