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Experiments to Further the Understanding of the Triple-α Process in Hot Astrophysical Scenarios N.R. PATEL, U. GREIFE, Colorado School of Mines, K.E. REHM, C.M. DEIBEL, J. GREENE, D. HENDERSON, C.-L. JIANG, B.P. KAY, H.Y. LEE, M. NOTANI, R. PARDO, Argonne National Laboratory, S.T. MARLEY, Western Michigan University, C.B. SEGAL, Florida State University, X.D. TANG, University of Notre Dame — The first 0^+ state of ^{12}C at 7.654 MeV (the Hoyle state) is the most relevant in the triple-α process for carbon nucleosynthesis. In explosive scenarios such as supernovae, the interference of the Hoyle state with the second 0^+ state located at 10.3 MeV in ^{12}C becomes significant. The recent NACRE listing assumes a 2^+ resonance at 9.117 MeV for which no experimental evidence exists. The states above 7.654 MeV level in ^{12}C were populated through the β-decay of ^{12}B and ^{12}N produced at the ATLAS in-flight facility at ANL. The decay of ^{12}C into three alphas is detected in a twin Frisch grid ionization chamber, acting as a calorimeter. This minimizes the effects of β-summing and allowed us to investigate the minimum above the Hoyle state with much higher accuracy than previously possible. A detailed data analysis will include an R-matrix fit to determine an upper limit on the 2^+ resonance. Work is supported by U.S. DOE, ONP under contracts DE-AC02-06CH11357 (ANL), DE-FG02-04R41320 (WMU), NSF grant PHY01-40324, and JINA NSF-PFC grant PHY02-16783.

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