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Measuring the Radiative Width of the Hoyle State in ^{12}C[1]

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— In stellar nucleosynthesis the conversion of helium into heavier elements begins with the triple-α process, in which three α particles combine to form ^{12}C. The rate of this process is governed by the 0^+ second excited state of ^{12}C which provides a resonance for the α+^{8}Be$\rightarrow$ ^{12}C* at an excitation energy 7.65 MeV (the Hoyle state). Overwhelmingly, the 7.65 MeV state decays by α particle to ^{8}Be which then breaks up into two α particles. However, there is a small radiative decay branch (approximately 4×10^{-4}) which allows the excited ^{12}C* nucleus to decay to its ground state. A new measurement of the ratio of the radiative width to the total width has been performed by the Lawrence Livermore National Laboratory and Lawrence Berkeley National Laboratory STARS/LIBERACE collaboration. Current results and the our experimental method will be presented.

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