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Reaction rates of the fusion reaction ^{12}C+^{12}C at E$_{CM}$ = 2.10 to 4.75 MeV for the ^{20}Ne and ^{23}Na exit channels TIMOTHY SPILLANE, University of Connecticut, FRANCESCO RAIOLA, Experimentalphysik III, Ruhr Universität Bochum, Germany, SHENG ZENG, Chinese Institute of Atomic Energy, Beijing, China, HANS-WERNER BECKER, Fakultät für Physik und Astronomie, Ruhr Universität Bochum, Germany, CRISTINA BORDEANU, Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), Romania, CLAUS ROLFS, Experimentalphysik III, Ruhr Universität Bochum, Germany, JEFFREY SCHWEITZER, University of Connecticut, FRANK STRIEDER, DANIEL SCHÜRMANN, Experimentalphysik III, Ruhr Universität Bochum, Germany, LUCIO GIALANELLA, Dipartimento di Scienze Fisiche, Universita Federico II, Napoli and INFN, Napoli, Italy — The fusion reaction ^{12}C + ^{12}C has been studied at E$_{CM}$ = 2.10 to 4.75 MeV by γ-ray spectroscopy using a C target of ultra-low hydrogen contamination. The deduced astrophysical $\tilde{S}$(E) factor exhibits previously unknown resonances at E $\leq$ 3.0 MeV, in particular a strong narrow resonance at E = 2.14 MeV, which lies at the high-energy tail of the Gamow peak. The resonance increases the present non-resonant reaction rate of the α channel significantly near T = 8 x 10^8 K. Due to the resonance structure, extrapolation to the Gamow energy E$_G$ = 1.5 MeV is quite uncertain.

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