^{12}C(^{40}Ca,^{12}C) 2011Ra43

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, J. E. Purcell and C. G. Sheu	NP A968,71 (2017)	1-Jan-2017

2011Ra43: XUNDL dataset compiled by TUNL, 2011.

Measured α-particle multiplicity =3 events using a high-efficiency charged particle array with the aim of characterizing the 3α decay mode of the ^{12}C*(7.65 MeV) Hoyle state. A beam of 25 MeV/nucleon ^{40}Ca ions from the INFN Cyclotron in Catania impinged on a 320 μg/cm^2 ^{12}C target and ejectiles were detected in the 1192 element ΔE-E Si-CsI(Tl) CHIMERA 4π array. Kinematic energy reconstruction and particle correlation functions were used to evaluate the ^{12}C excitation energies and decay modes for ^{12}C$\rightarrow 3\alpha$ decay events.

Contributions are observed for DDE: direct emission via 3 equal energy α particles, SD: sequential decay via α+^{8}Be$_{g.s.}$, and DDL: decay from a linear chain of α particles where one α-particle remains at rest while the decay energy is shared by the other two.

^{12}C Levels

E(level)	J$^{\pi}$[†]	T$_{1/2}$	Comments
7.61×10^3	0$^+$	0.33 MeV	E(level): Known parameters are E$_x$=7.64 MeV and Γ=8.5 eV. 3α decay is (7.5 *40*)% DDE, (9.5 *40*)% DDL and (83.0 *50*)% SD. However, see (2012Ma10) who attempted to verify this result, but found evidence only of sequential decay through ^{8}Be$_{g.s.}$ (a limit of <0.45% may be attributed to direct 3-body breakup).
9.64×10^3	3$^-$	1.14 MeV	E(level): known parameters are E$_x$=9.64 MeV and Γ=34 keV; the resonance peak may have contributions from the broad E$_x$=10.3 MeV, J$^{\pi}$=0$^+$ state.

[†] From Adopted Levels.