# CLUSTER DECAY OF THE HIGH-LYING EXCITED STATES IN 14C

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A cluster-transfer experiment of $^{9}$Be($^{9}$Be,$^{14}$C $\rightarrow$ $\alpha$ +$^{10}$ Be)$\alpha$ at an incident energy of 45 MeV was carried out in order to investigate the molecular structure in high-lying resonant states in $^{14}$C. Using entirely silicon detectors, which are presently the best for energy resolution and particle identification, we were able to clearly reconstruct the reaction $Q$-value and the high-lying resonant states in $^{14}$C from the $^{10}$Be + $\alpha$ cluster-decay channel. The applied reaction is of extremely large $Q$-value, making it an excellent case to select the reaction mechanism and the final states in the outgoing nucleus. Specifically the ground, first excited (3.4 MeV) and $\sim$ 6 MeV excited states in $^{10}$Be can be clearly separated by using the $Q$-value spectrum. The contamination and background are much less than the previous measurements. The high-lying excited states in $^{14}$C are reconstructed from this cluster-decay channel, corresponding to the three well discriminated final states in $^{10}$Be. Most of the presently measured states, which decay to $^{10}$Be$_{gs}$ and to $^{10}$Be$^{*}$(3.4MeV, $2^{+}$), agree very well with the previous observations, while a new state at 23.5 MeV is clearly identified. The states at 22.4 and 24.0 MeV are of special interest since they decay exclusively into 6 MeV states in $^{10}$Be. The latter posses typical chain-state character, indicating a large probability to find the exotic linear-chain structure at these very high excited states in $^{14}$C, considering the structural link in the decay.