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Cluster Structures in 16C

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Theoretical calculation indicates the existence of molecule configuration in 16C. Linear-chain configuration is a current research hotspot of various molecule configurations. The excited states of 16C with $\pi 2\sigma 2$ configuration for the four valence neutrons is one of the most promising candidates for the linear-chain structure. The linear-chain configuration generates a rotational band built on the 05+ state at 15.5MeV that is close to the 4He+12Be and 6He+10Be threshold energies and stable against the bending motion.
In experiments, there are several observables for cluster formation in a resonant state:
1.Excitation energy vs spin systematics: Requires good energy resolution, large statistics and good peak separation.
2.Large cluster decay width: Requires coincident measurement of both the fragments and the very low energy recoiled target particles.
3.Characteristic transition strength: Requires measurement of the angular distribution with very small cross sections.
Our group have completed relevant experiments on HIRFL(Lanzhou, China), and the main goal is to investigate the 3 alpha linear-chain structure in the high-lying excited state of 16C(Ex=14 ~ 25MeV) via 1H(16C,4He + 12Be)1H and 1H (16C,6He + 10Be)1H inelastically break up reaction at 30MeV/A with both the invariant mass and missing mass methods in inverse kinematics.

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