LBNL Nuclear Physics Forum

Thursday, February 1, 2018 @ 10:00 am

Building 88 Lounge (2nd floor)

Cookies and coffee available from 9:45am

Dr. Christopher Morse

University of Massachusetts Lowell

"Enhanced Collectivity in ^{12}Be"

Electromagnetic quadrupole transition strengths are a sensitive probe of the evolving structure of exotic nuclei, particularly the competition between collectivity and magicity. This competition is of particular interest in the case of the beryllium isotopes, which are known to display properties indicative of α-clustering. The N=8 nucleus ^{12}Be has been studied extensively in this regard, as it embodies a tension between this collective behavior and a reversion to non-collective behavior at the shell closure. Experimental evidence, particularly the dramatic drop in the 2_1^+-state energy relative to the lighter beryllium isotopes, indicates that the N=8 shell closure is quenched in ^{12}Be. In contrast, the evolution of the B(E2;$2_1^+ \rightarrow 0_1^+$) transition strength appears rather flat across the isotopic chain, suggesting lower collectivity than expected. In order to resolve this ambiguity, we have performed a new lifetime measurement of the 2_1^+-state of ^{12}Be. The lifetime was measured using the Doppler Shift Attenuation Method with GRETINA. Excited states of ^{12}Be were produced via inelastic scattering at 55 MeV/nucleon and identified in the S800, using several different targets to control for systematic uncertainties in the stopping powers. We find that the lifetime of the 2_1^+-state is considerably shorter than previously reported, indicating that this nucleus is more collective than previously thought. This result supports the quenching of the N=8 shell gap in ^{12}Be and may indicate a deformed or 2α-clustered structure for this nucleus.

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