E437

RCNP EXPERIMENT E

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:
Spectroscopy of ^{15}B: A search for unexpected bound states

SPOKESPERSON:

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Hooi Jin Ong	RCNP, Osaka University	Lecturer
and the CAGRA collaboration		

RUNNING TIME: Installation time without beam — 5 days
Data run — 7 days

BEAM LINE: EN Course

BEAM REQUIREMENTS:

Type of particle	^{16}C
Beam energy	20-40 MeV/u (320 - 640 MeV)
Beam intensity	5x10^5 particles-per-second

BUDGET: Experimental expenses — 0 yen

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SUMMARY OF THE PROPOSAL

Bound states in ^{15}B are to be populated through the one proton removal reaction on a ^{16}C beam and γ-rays from decaying states identified by an array of Compton-suppressed HPGe Clover detectors (CAGRA) with goals of identifying previously unexpected bound states and assigning spins to excited states for the first time. To date only two bound states have been found in ^{15}B, neither with firm spin or parity assignments. The present work is aimed at identifying other possible excited states residing below the neutron separation energy in ^{15}B, in particular to determine whether an excited $3/2^-$ state is present. Additional information on newly found states, as well as the two previously identified levels will be obtained through γ-ray angular distributions and intensity ratio measurements. An excited $3/2^-$ state is not predicted to reside below the ^{15}B S_n by various modern calculations, however, a robust systematic has been observed for states of s-wave character in the $p-sd$ region. An extension of these systematics have been applied to neutron-rich N=10 systems involving two-neutron $(sd)^2$ configurations suggesting the state may appear lower in excitation energy than expected. A similar trend in the energy differences was noticed between ground $(p)^2$ neutron states and excited $(sd)^2$ neutron states in the N=8 neutron-rich isotones. Furthermore, firm spin assignments will provide new information to compare with theoretical predictions and to generate additional systematic studies in the N=10 isotones when transitioning from ^{16}C into ^{14}Be.