

PROPOSAL FOR EXPERIMENT AT RCNP

28 July 2017

TITLE: study of intruder configuration in ^{15}B via transfer reaction**SPOKESPERSON:**

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EXPERIMENTAL GROUP:

Full Name	Institution	Title or Position
Jianling Lou	State Key Lab., Peking university	Assistant Professor
Yanlin Ye	State Key Lab., Peking university	Professor
Jenny Lee	Hongkong University	Researcher
Dongxing Jiang	State Key Lab., Peking university	Professor
Hui Hua	State Key Lab., Peking university	Professor
Zhihuan Li	State Key Lab., Peking university	Associate Professor
Yucheng Ge	State Key Lab., Peking university	Researcher
Jinyan Xu	State Key Lab., Peking university	engineer
Qite Li	State Key Lab., Peking university	engineer
He Wang	RIKEN, Nishina Center, Japan	postdoc
Zaihong Yang	RIKEN, Nishina Center, Japan	postdoc
Jie Chen	Argonne National Laboratory, USA	postdoc
Jing Li	Argonne National Laboratory, USA	postdoc
Hongliang Zang	State Key Lab., Peking university	D4
Qiang Liu	State Key Lab., Peking university	D4
Jun Feng	State Key Lab., Peking university	D4
Biao Yang	State Key Lab., Peking university	D3
Yang Liu	State Key Lab., Peking university	D3
Liu Wei	State Key Lab., Peking university	D2
Ying Jiang	State Key Lab., Peking university	M2
Chen Yidi	State Key Lab., Peking University	M1
N. Aoi	RCNP, Osaka University	Professor
E. Ideguchi	RCNP, Osaka University	Associate Professor
H. J. Ong	RCNP, Osaka University	Assistant Professor

THEORETICAL GROUP:

Full Name	Institution	Title or Position
Danyang Pang	Bei Hang University, China	Associate Professor

RUNNING TIME:	Installation time without beam	15 days
	Test running time for experiment	1 day
	Data runs	9 days(192 hrs)
	Total beam time	10 days (240 hrs)

BEAM LINE: Ring : EN course

BEAM REQUIREMENTS:	Type of particle	^{18}O
	Beam energy	65 MeV/u
	Beam intensity	$\geq 1250 \text{ pA}$

BUDGET:

(1) Shipping the converting flanges for large scatter chamber, and some electronics from RIKEN to RCNP. 500 k yen

(2) Flat cables and cable connector. 500 k yen

Total budget: 1,000 k yen

♣ Travel and local expenses for the participants from institutes in Japan are to be provided by RCNP.

♣ Local expenses for the Peking group, especially for some students are hoped to be provided by RCNP.

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SPOKESPERSON: Jianling Lou, Yanlin Ye

SUMMARY OF THE PROPOSAL

In light neutron-rich nuclei around $N = 8$, the $2s_{1/2}$ orbital usually intruder into $1d_{5/2}$ or $1p_{3/2}$ orbits, leading to large amount s -wave component appearing in their ground-state wave functions. The present proposed experiment aims at quantitatively investigating the intruder s -wave strength in the ground and low-lying excited states of ^{15}B , via the highly selective $d(^{14}\text{B},p)^{15}\text{B}$ transfer reaction at 20-30 MeV/nucleon in inverse kinematics for the first time. Till now, only two bound and several unbound excited states were observed experimentally for ^{15}B , neither s -wave intruder information nor the spin-parity for each state was available from experiment. The single-particle states, both the particle-bound and the particle-unbound states in ^{15}B will be populated by $d(^{14}\text{B},p)$ reaction. The spectroscopic factor corresponding to intruder s -wave component in each identified state of ^{15}B will be extracted by comparing the transfer cross sections with the distorted wave Born approximation (DWBA) calculations. Moreover, the spin-parity for each separated state of ^{15}B will be confined according to the shapes of angular distributions, which provides the possibility to search for the excited $3/2^-$ state. Furthermore, the s -wave spectroscopic factor and confined spin-parity information for these states will provide new information to compare with theoretical predictions and to study the systematic in the $N = 10$ isotones, namely ^{16}C , ^{15}B , ^{14}Be and so on.