Nishina Center　Symposium/mini-WS　Report

（mail to：sympo-kyoyo@ribf.riken.jp）
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Name: Kenichi Yoshida
Department: Theoretical Nuclear Physics Lab.
Tel:　3033　Fax: 3030
E-mail: Kenichi.Yoshida@riken.jp

Title	Further understanding of 'Island of Inversion' via nuclear moments and inelastic reactions
HP address	http://indico.riken.jp/indico/conferenceTimeTable.py?confId=288
Date	20 – 21 December, 2010
Summary of discussion and its advances (expected in the future)	We discussed the present status of the experimental and theoretical studies on the 'island of Inversion' especially putting emphases on the 1. Shell structures and deformation via nuclear moments 2. Dynamics and shell structures via inelastic reactions 3. Reaction theory bridging the nuclear structure and observables. The resent experiments performed at GANIL on the nuclear moments were presented and the future perspectives on the moment measurements of the isomeric state were discussed by Ueno. Shimoda presented the experimental data of the beta-delayed decay of spin-polarized isotopes obtained at TRIUMF. Lowering of the negative-parity state in Mg isotopes located in the west region of the 'Island of Inversion' indicates the onset of the shell quenching. The recent experiments performed at RIBF were reviewed by Aoi. An anomaly in ^{28}Ne and the precise spectroscopic study of ^{32}Mg were presented. Nakamura discussed the deformation effect in ^{31}Ne via Coulomb breakup. Possibility of the p-wave halo was investigated in detail as well as the s-wave halo. Takechi presented the systematic experimental data of the interaction cross sections for Ne and Na isotopes. They are accurate enough to investigate the nuclear structure such as deformation. The quadrupole moments of neutron-rich Al isotopes located in the north region of the 'Island of Inversion' were calculated in the framework of the energy-density functional method by Yoshida. Pairing and weak binding effects were discussed to generate the quadrupole collectivity. Utsuno reviewed the large-scale shell-model calculations for the 'island of

	Inversion'. Coexistence of the normal and intruder states in Na isotopes were shown. He suggested that comparison of Mg and Ne would give a less model dependent approach to detect the narrowing N=20 shell gap. Kimura presented the results of the calculation based on the antisymmetric molecular dynamics. He showed the coexistence of many-particle-many-hole states in the low energy region of 'Island of Inversion.' He suggested that the detailed studies on the odd-mass nuclei would give a further understanding of the nature of the 'Island of Inversion'. Hinohara presented the results of the calculation based on the quadrupole collective Hamiltonian approach. He pointed out that the large-amplitude dynamics dominates in the low-lying excitations of ^{32}Mg. Yahiro developed a microscopic theory for the nucleon removal reaction employing the Eikonal reaction theory using the t-matrix. He discussed the comparison between his new theory and the Glauber model widely used. Minomo applied it to ^{31}Ne induced reaction. This new theory relies on the microscopic structure model. Matsumoto presented the recent progress on treating the four-body continuum states in the framework of continuum-discritized coupled-channel method and discussed the microscopic mechanism for the nuclear and Coulomb breakup reactions. Suzuki discussed the halo structure of ^{31}Ne in the Glauber model. The following questions arose during the discussion. They are deeply related to the fundamental understanding of the nature of the 'island of Inversion', and could become the spearhead for the future studies: What is the microscopic mechanism of the enhance quadrupole collectivity? Is it due to the shell quenching? The tensor correlation and/or the weakly binding effect account for the shell quenching? Pairing correlations are enhanced due to the weak binding? Is it uniquely seen in the 'Island of Inversion' or generically seen, for example, in the Be and Cr isotopes? Are the 'Island of Inversion' nuclei really suited for investigating the tensor correlation and the weakly binding effect? The reaction theory taking into account explicitly the deformation of the core is needed? When the angular momentum is projected to a good quantum number, the system looks normal. What kind of quantity is sensitive to the deformation?

About applicant: Name, Affilication	YOSHIDA Kenichi (RIKEN Nishina Center) TAKEUCHI Satoshi (RIKEN Nishina Center) KIMURA Masaaki (Hokkaido University)		
About Participants Name, Affiliation (Department)	1	UENO Hideki	RNC
	2	UTSUNO Yutaka	JAEA
	3	SHIMODA Tadashi	Osaka Univ.
	4	AOI Nori	RNC
	5	HINOHARA Nobuo	RNC
	6	YAHIRO Masanobu	Kyushu Univ.
	7	MINOMO Koshou	Kyushu Univ.
	8	MATSUMOTO Takuma	Hokkaido Univ.
	9	NAKAMURA Takashi	TITECH
	10	SUZUKI Yasuyuki	Niigata Univ.
	11	TAKECHI Maya	RNC
	12	SEKIZAWA Kazuyuki	Univ. of Tsukuba
	13	OOISHI Hiroto	Univ. of Tsukuba
	14	FUJII Shinichiro	Univ. of Tokyo
	15	H.Scheit	RNC
	16	KOHAMA Akihisa	RNC
	17	IKEDA Akitsu	RNC
	18	SAKURAI Hiroyoshi	RNC
	19	ENYO Yoshiko	Kyoto Univ.
	20	KAKI Kaori	Shizuoka Univ.
	21	SATO Koichi	Kyoto/RNC
	22	MATSUSHITA Masafumi	Rikkyo/RNC
	23	OTSU Hideaki	RNC
	24	NISHIMURA Shunji	RNC
	25	YONEDA Kenichiro	RNC
	26	TANIGUCHI Yasutaka	RNC
	27	TANABE Kazuko	Otsuma Univ.
	28	MOTOBAYASHI Tohru	RNC
	29	ISHIHARA Masayasu	RNC
	30	J.Lee	RNC
	31	MATSUYANAGI Kenichi	RNC
	32	OTSUKA Takaharu	Univ. of Tokyo
	33	KOBAYASHI Nobuyuki	TITECH
	34	NAKATSUKASA Takashi	RNC
	35	HAMAMOTO Ikuko	Lund Univ.

	36 SUZUKI Toshio Nihon Univ. 37 TSUNODA Naofumi Univ. of Tokyo 38 IDEGUCHI Eiji CNS	
Supported expenses	（in total） 148,140 Yen	（breakdown） Travel and lodging expenses Shimoda: 39,786 Yen Kimura: 38,200 Yen Matsumoto: 39,600 Yen Utsuno: 14,464 Yen Coffee, tea and snacks: 16,090 Yen

＊Please attach other documents as needed.