RIBF ULIC Symposium/mini-WS Report

*** English only**

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Name of Applicant	Masaki Sasano		
Affiliation	RIKEN, Spin-Isospin Laboratory	e-mail	sasano@ribf.riken.jp
Tel	048-462-4967	Fax	

Title	[RIBF-ULIC-miniWS-014] A new method for studying di-neutron correlations via the (p,n) reaction in inverse kinematics
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Contact Person(s) (Name, Affiliation)	Masaki Sasano (RIKEN), Hiroyuki Sagawa (Aizu Univ.)

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Summary of discussions and its (expected) results:

A new method for studying di-neutron correlation [1] via the (p,n) reaction in inverse kinematics was discussed. In this method, the Gamow-Teller (GT) transition induced by the (p,n) reaction changes di-neutron (T=1,S=0) into deuteron (T=0, S=1) by transferring one unit both of spin and isospin. Such GT transition is expected to carry a large strength of about 3(N-Z)=3(2-0)=6, and could be clearly identified by measuring the GT strength and the branching ratio of deuteron-emission with a recently developed technique of (p,n) measurement in inverse kinematics [2]. An advantage of this method over soft E1 study via Coulomb breakup reaction [1] is that the theoretical treatment of the final state after the reaction may be easier than in Coulomb breakup studies, because the final state is a two body scattering state consisting of deuteron, whose structure is well known, and a core nucleus. In the case of breakup, the final state is a three body scattering state, and all the final state interactions between the three constituents (two neutrons and a core nucleus) is significantly large, and may hamper the signature of two-neutron correlations in the ground state [3]. During the discussion, it was found that several effects must be considered further; for example, 1) a low-energy deuteron created from di-neutron can be absorbed because of resonance states with the core, 2) the structure of the “deuteron” originating from di-neutron can vary before the emission (deuteron internal wave function depends on the distance from the core). Currently, these effects are being theoretically investigated.

[1] For example, T. Nakamura et al., Phys. Rev. Lett. 96, 252502 (2006).
[2] M. Sasano et al., Phys. Rev. Lett. 107, 202501 (2011).
[3] Y. Kikuchi et al., Phys. Rev. C 81, 044308 (2010).

Participants list(Name, Affiliation):

Masaki Sasano (RIKEN), Hiroyuki Sagawa (Aizu Univ.), Tomohiro Uesaka (RIKEN), Toshio Suzuki (Nihon University/CNS, Univ. of Tokyo), Kentaro Yako (Univ. of Tokyo), Munetake Ichimura (RIKEN), Kenjiro Miki (RCNP, Osaka Univ.)