NNR19 Neutrino Nuclear Responses for Double Beta Decays and Astro Neutrinos

H. Ejiri, T. Shima and A. Tamii
RCNP Osaka University
ejiri@rcnp.osaka-u.ac.jp shima@rcnp.osaka-u.ac.jp, tamii@rcnp.osaka-u.ac.jp

This is a brief report on the workshop, NNR19 (neutrino nuclear responses for double beta decays (DBD) and astro neutrinos) at RCNP Osaka in May 8-9, 2019. Active 38 physicists (21 foreign physicists, including 4 visitors working in Japan, and 17 Japanese ones) joined NNR19 and very interesting 28 talks were presented there. The host institute was RCNP Osaka University.

Productive discussions were made on current subjects on neutrino nuclear responses and electro-weak interactions in nuclei to promote studies of symmetries beyond and within the electro-weak standard model. So, the present workshop was very informative and productive as originally planned.

The details are given in the web. site, https://indico.rcnp.osaka-u.ac.jp/event/1265/ . The next NNR workshop will be held in 2021.

A: Motivations

Neutrino nuclear responses (NNRs) are crucial for studying neutrinos of astro-particle physics interests through nuclear CC and NC interactions. The NNR workshop aims at active discussions on the present status and perspectives of NNRs.

The NNR14（Neutrino Nuclear Responses for neutrino studies in nuclei) was held at RCNP in Nov. 2014, and NNR16 (Neutrino Nuclear Responses for double beta decays and astro neutrinos) at RCNP in Sept. 2016, as given in their web. sites.

The present NNR19 emphasizes extensive discussions on the present status and the perspectives on neutrino nuclear response studies for DBD and astro neutrinos. Neutrino response is given by square of nuclear matrix element (NME).

Recently they have been studied extensively by nuclear spin-dipole charge-exchange reactions (CERs), double CERs, nuclear inelastic-scatterings, electro-magnetic (EM) interactions and lepton ($\mu-\nu$) charge exchange reactions. Progresses have been made to improve DBD NME calculations. Renormalization (quenching) of CC/NC and EM responses are of particular current interest. The RCNP high energy-resolution system and the MuSIC muon beam line are quite promising for experimental studies of the neutrino nuclear responses relevant to DBD and astro-neutrinos.

NNR19 intends to reinforce coordinated studies of neutrino nuclear responses by various experimental and theoretical approaches, and to encourage young-brain active scientists for neutrino studies in nuclei..

B: Organizers

Chair persons: H. Ejiri, T. Shima and A. Tamii*,

* Contact person A. Tamii (tamii@rcnp.osaka-u.ac.jp)

Organizers

A. Bracco Milano, F. Cappuzzello Catania, I. Hashim UTM Johor,
T. Kajino NAO Tokyo, H. Kosmas UOI Ioannina, J. Menendez Tokyo,
P. von Neumann-Cosel TU-Darmstadt, H. Sagawa Aizu,
M. Sakuda Okayama, J. Suhonen Jyvaskyla Finland,
T. Uesaka Riken Tokyo, K. Zuber TU Dresden.

C: Subjects discussed include

1. Neutrino nuclear CC responses and NMEs for double beta decays
2. Neutrino CC and NC responses for solar and supernova neutrinos
3. Nucleon and muon charge exchange reactions for CC responses
4. Double charge exchange reactions and double GT responses
5. Nuclear inelastic reactions for neutrino NC responses
6. Electro-magnetic responses of nuclei and NC responses
7. Renormalization (quenching) of weak and electromagnetic responses.
8. Theoretical developments of neutrino nuclear responses.
9. Related subjects.

D: Sessions

NNR19 consists of 9 scientific sessions. They are I opening, II neutrino nuclear responses, III supernovae and neutrino detection, IV muon reactions and weak decays, V double GT responses, VI double beta decays and nuclear matrix elements, VII electromagnetic nuclear responses, VIII charge exchange reactions, and IX related subjects.

Two related discussion meetings were held before and after NNR19. They are Muon charge exchange reactions for double beta decays in May 7 2019, and GR and scintillation gamma detector project in May 10 2019.

E: Support

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