International symposium on "Direct reactions and spectroscopy with hydrogen targets: past 10 years at the RIBF and future prospects"

R. Taniuchi,[*1,*2] F. Browne,[*3,*4] and H. N. Liu[*5] for the Organising Committee

The use of the Magic Number Off Stability (MINOS)[1] liquid-Hydrogen target and vertex-tracking system, along with the Detector Array for Low Intensity radiation 2 (DALI2) γ-ray spectrometer and other systems at the Radioactive Isotope Beam Factory (RIBF) has yielded abundant and exciting physics results. These include the first spectroscopy of doubly magic nuclei, investigation of multi-neutron decays, and shell evolution along isotopic chains. These studies with direct reactions have advanced our understanding of nuclear reaction mechanisms and nuclear structure. The advances simultaneously open novel physics questions and pave the way for novel experimental setups to address them. Through a combination of particle- and gamma-spectroscopy with a broad range of nuclear reactions, new frontiers will be established in our understanding of the structure and reaction mechanisms.

The symposium on direct reactions and spectroscopy with Hydrogen targets was held in York, United Kingdom, from July 31st to August 4th, 2023. It aimed at reviewing and celebrating the experimental and theoretical work with liquid Hydrogen targets at the RIBF facility, RIKEN, over the last decade, while also initiating discussions on future plans and perspectives. The key topics of the symposium are listed below, covering gamma-ray spectroscopy experiments for nuclear structure studies, reaction studies at intermediate energy using magnetic spectrometers, theoretical work, and detector developments.

- Shell migration at the neutron numbers $N = 32,\ 34$ around Ca
- Island of inversion at the neutron number $N = 40$
- Shell structure around the ^{78}Ni isotope
- Collectivity from Zn to Zr
- Structure of halo nuclei
- Shell evolution towards the ^{28}O isotope
- Clustering and multi-neutron systems
- Theoretical and experimental studies of the reaction mechanism
- Development of new detection devices

The five-day symposium comprised invited talks and poster contributions, encouraging participation from early-career researchers. Approximately 50 nuclear physicists, theorists and experimentalists, from more than 10 countries, including Japan, Germany, China, and the USA, convened in York. Lively discussions were undertaken during and outside the sessions, creating a relaxed atmosphere.

Fig. 1. Conference group photo: Captured against the backdrop of Clifford's Tower, York.

Financial support for the symposium was provided by the JSPS London office, The Institute of Physics, and The European Physical Journal. Essential support was also received from the RIKEN Nishina Center and the University of York. Sidong Chen and Ryo Taniuchi from the University of York served as the local organising committee. Further details of the symposium, such as the programme, can be found on the Indico page.[2]

Scientific Advisory Committee

- Pieter Doornenbal (RIKEN)
- Alexandre Obertelli (TU Darmstadt)
- Tomohiro Uesaka (RIKEN)

Organising committee

- Frank Browne (CERN)
- Sidong Chen (University of York)
- Martha Liliana Cortés (RIKEN)
- Julian Kahlbow (MIT and Tel-Aviv University)
- Yuki Kubota (RIKEN)
- Hongna Liu (Beijing Normal University)
- Clementine Santamaria (Morgan State University and MSU)
- Junki Tanaka (RIKEN)
- Ryo Taniuchi (University of York)
- Zaihong Yang (Peking University)
- Kazuki Yoshida (Japan Atomic Energy Agency)

*1 School of Physics, Engineering and Technology, University of York
*2 RIKEN Nishina Center
*3 Department of Physics and Astronomy, University of Manchester
*4 ISOLDE, CERN
*5 Department of Physics, Beijing Normal University

References
1) A. Obertelli *et al.*, Eur. Phys. J. A **50**, 8 (2014).
2) https://indico.stfc.ac.uk/e/minos_ribf .

DOI:10.34448/RIKEN.APR.57-302