国立研究開発法人理化学研究所　仁科加速器科学研究センター
第328回 RIBF核物理セミナー
RIKEN Nishina Center for Accelerator Based Science
The 328th RIBF Nuclear Physics Seminar

Determination of the neutron dripline at fluorine and neon and discovery of 39Na conducted at RIKEN RIBF

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I will talk about the recent new-isotope experiments conducted at RIKEN RIBF [1] using the BigRIPS separator [2] and an intense 48Ca beam at 345 MeV/u, in which we searched for the new isotopes 32,33F, 35,36Ne, and 38,39Na located close to the neutron-rich limit of existence. The experiments allowed the first determination of the neutron dripline at fluorine and neon to be 31F and 34Ne, respectively [3] and the discovery of an extremely neutron-rich isotope 39Na with neutron number N = 28 [4]. These results provide us with a key to understanding the nuclear structure under such extremely neutron-rich conditions. The location of neutron dripline and the nuclear binding close to the limit of existence are determined reflecting details of underlying nuclear structure, such as the evolution of nuclear shell property and associated nuclear deformation. The nuclear deformation, caused by the magicity loss at N = 20 and 28, plays a key role in the nuclear binding in this region and thus in determining the particle stability of 39Na as well as the location of the neutron dripline at 31F and 34Ne. I will try to outline the discussions of such intriguing nuclear structure as well as overview the experiments.

[1] Y. Yano, Nucl. Instrum. Methods Phys. Res., Sect. B 261, 1009 (2007).
[2] T. Kubo, Nucl. Instrum. Methods Phys. Res., Sect. B 204, 97 (2003).
[3] D. S. Ahn, N. Fukuda, H. Geissel, N. Inabe, N. Iwasa, T. Kubo, K. Kusaka, D. J. Morrissey, D. Murai, T. Nakamura, M. Ohtake, H. Otsu, H. Sato, B. M. Sherrill, Y. Shimizu, H. Suzuki, H. Takeda, O. B. Tarasov, H. Ueno, Y. Yanagisawa, K. Yoshida, Phys. Rev. Lett. 123, 212501 (2019).
[4] D. S. Ahn, J. Amano, H. Baba, N. Fukuda, H. Geissel, N. Inabe, S. Ishikawa, N. Iwasa, T. Komatsubara, T. Kubo, K. Kusaka, D. J. Morrissey, T. Nakamura, M. Ohtake, H. Otsu, T. Sakakibara, H. Sato, B. M. Sherrill, Y. Shimizu, T. Sumikama, H. Suzuki, H. Takeda, O. B. Tarasov, H. Ueno, Y. Yanagisawa, K. Yoshida, Phys. Rev. Lett. 129, 212502 (2022).
Reference: Isotope News No. 789, pp. 2-7.(Japanese only)

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via Hybrid (Zoom + RIBF Hall)

＊The talk will be given in English language.

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