

## Report of the RCNP International Joint Usage/Research

### 1 Title of research:

Development of permanent magnet compact ECR ion source

### 2 List of collaborators:

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T. Yako, Doctor Student, Dept. of Science, Kyoto Univ.

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### 3 Period of research:

Nov. 2019 – March 2020

### 4 Main location of collaboration implementation:

Accelerator Laboratory, ICR, Kyoto University,  
Gokanoshō, Uji, Kyoto, Japan 611-0011

### 5 Publication list

Articles

(1) NA

Talks

(1) NA

Theses

(1) 修士論文 小型永久磁石型 ECR 水素イオン源の特性評価  
物理学・宇宙物理学専攻 物理学第二教室  
ビーム物理学研究室  
八子丈生            2020, January 29

### 6 Description of the results and outputs

A compact ECR ion source (ECR IS) is under development for pulsed protons at ICR. Application of permanent magnet allows the compactness and the fast gas valve can reduce the evacuation load to the vacuum system. These features enable us to install the IS close to an RFQ, which helps to realize practical accelerators for applications, such as compact neutron sources.

While the system still needs optimization of some parameters such as RF frequency, gas flow, valve timing, etc., some extracted beams are already available.

We tried to measure the emittance and found that the beam size at the monitor location is too large to fit in the screen size. While the extraction conditions were adjusted for a smaller beam size, we could not reduce the beam size small enough to fit in the screen. The efforts to prepare the emittance measurement are described in Mr. Yako's Master's thesis.

After he left from our laboratory, the vacuum pump of the test bench was once stopped because of a power outage for a maintenance of our power station. While all the study is delaying by the COVID-19, an Einzel lens is under preparation to focus the beam.