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## Observation of Beam Current Fluctuation Extracted from an Rf-Driven $H^-$ Ion Source

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In J-PARC, peak  $H^-$  current of several tens mA is produced from a cesiated hydrogen plasma ignited by a solid-state rf amplifier with the frequency of 2 MHz [1-3]. In case of the high-intensity  $H^-$  beam extracted from the ion source, the plasma density in the source chamber is so high that the ion sheath around the beam extraction area follows the rf oscillation. The reason is that the ion plasma frequency defined by the ion density is approximately 100 times higher than the driving frequency [4]. The potential fluctuation of the plasma is combined with the driving rf electric field and causes motion of charged particles in the plasma some changes. As a result, the  $H^-$  beam extracted from the source plasma also fluctuates. The beam current signal from a Faraday cup was measured by a spectrum analyzer. A powerful frequency spectrum at 2 MHz which is as same as that of the rf amplifier was observed. At the conference, we present results of the beam current fluctuation. It is thought that the beam particles have some fluctuation to the transverse motion perpendicular to the beam axis as well. Thus, we also propose a measurement system using a time-resolved and highly-sensitive emittance monitor in order to observe the beam fluctuation in the phase space.

### References

- [1] H. Oguri et. al., AIP Conf. Procs., Vol. 1869, .030053 (2017).
- [2] A. Ueno, New. Jour. Phys., Vol. 19, 015004 (2017).
- [3] K. Shinto et. al., "Present status of the J-PARC cesiated rf-driven  $H^-$  ion source", in these proceedings.
- [4] K. Shinto et. al., Rev. Sci. Instrum., Vol. 67, pp.1048-1050 (1996).

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