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Highly Time-Resolved Emittance Measurement for a High-Intensity H- Beam Extracted from a 2 MHz RF-Driven H- Ion Source

In most of proton accelerator facilities, H- ion sources with driving 2-MHz RF amplifiers for plasma production generate high-intensity H- beams. Because of the high plasma density in the ion source, the potential of the sheath adjacent to the plasma electrode may be oscillated with the RF driving frequency. We showed a low frequency oscillation of the beam current (AIP CP, **2011**, 080016 (2018)) and the beam profile (Rev. Sci. Instrum., **91**, 013330 (2020)).
We have been developing a highly time-resolved emittance measurement system in order to measure the fluctuation in association with the frequency of the rf source. The system is equipped with a low-noise differential FET amplifier with the frequency range up to 70 MHz and a digitizer with sampling rate of 60 MS/s enough to observe the fundamental and higher-harmonics fluctuation occurred by the RF source.
In this conference, we will show some results of obtained emittance fluctuation by using the system and discussion of possible mechanisms.

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