

Beam Monitoring and Interlock System for Front-end Upgrade of J-PARC LINAC

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In the J-PARC Linac, an upgrading of a beam current up to 50mA using an RF-driven ion source and a new RFQ (Radio Frequency Quadrupole) linac cavity is in progress. The test stand was newly assembled to check the performances of the ion source and the RFQ. We had designed, fabricated and used the beam monitoring systems which are consisted of the beam current monitors for the beam transmission measurement and the beam phase

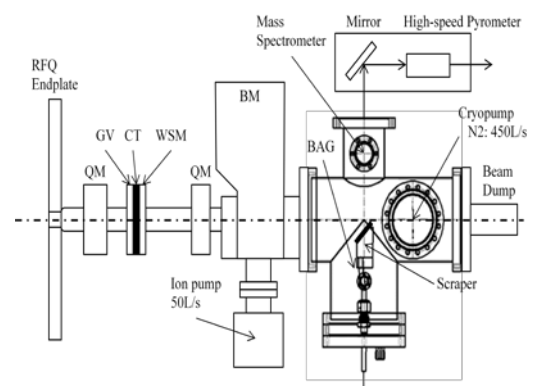


Fig. 1: The beam line of RFQ test stand.

monitors for the energy measurement in the test stand since 2013. In addition, we have developed the new front end beam transport as MEBT1 (the beam transport between RFQ and Drift Tube Linac) with new scraper system and the chopper cavity to be used for the higher beam current as 50mA. In the new scraper system, we will use the new material with high durability and the tandem system to reduce the heat loading by the new chopper cavity. In order to protect the scraper, we need to observe the temperature continuously and to avoid the excess heat loading of the scraper surface. Therefore we started the development of the additional interlock system for the high temperature and for the total particle numbers. We also monitor the beam transmission between the upstream and downstream of the chopper cavity to check the chopping errors using beam current monitor. The assembly of the test stand was changed and started to evaluate the performances of the scraper material with the additional interlock systems. We refer to the detail of the beam monitoring system and new interlock system in the test stand as well as the data obtained during the performance test. As these monitoring and interlock system will be adopted for the new MEBT1 beam line, the detail of MEBT1 is also mentioned.