In order to simulate beam acceleration in the 5-stage negative ion accelerator for the ITER NBI, beam acceleration experiments in MeV Test Facility (MTF) was performed with the same acceleration gap length and space charge effect with the ITER accelerator.

Accurate beam deflection compensation was demonstrated by newly developed grid to measure deviation of grid heat load.

Reduction of grid heat load from the long pulse accelerator suggests feasibility of stable beam acceleration in ITER accelerator.

In QST, long pulse operation of 1MeV, 200A/m² acceleration (same beam power density as ITER D) has been tested.

**Summary**

- 1MeV, 190A/m², 60s has been achieved by applying R&D results of
  - beam deflection compensation
  - dedicated grid shape for suppression of heat load due to secondary particle
  - optimization of geometry of accelerator for voltage holding

**< Remaining task >**

- 1MeV beam acceleration with the same acceleration gap length as ITER accelerator (88mm)

Higher space charge effect requires a stronger focusing electric field.

**< Issues >**

- Reduction of grid heat load for stable beam acceleration with shorter gap
- Voltage holding capability with 88mm gap

**Accurate measurement of beam deflection compensation effect**

Newly developed grid to measure deviation of grid heat load profile in accelerator by beam deflection was installed.

**Experimental simulation of beam acceleration**

- H⁺ ion acceleration at the perrance of 1MeV, 280A/m² was achieved with the same gap length of ITER accelerator.
- Total heat load / input power was reduced compared to in the previous gap length, which suggests feasibility of stable acceleration of 1MeV, 200A/m², D⁻ in the ITER accelerator.