



Contribution ID: 185

Type: **Parallel Session (Contributed Oral)** talk

Study of Negative Ion Based Injector Prototype at Budker Institute of Nuclear Physics

Friday 24 September 2021 09:20 (20 minutes)

A high-voltage neutral beam injector, based on the acceleration of a negative hydrogen ion beam is under construction at the Institute of Nuclear Physics [1]. In contrast to the traditional scheme of the multiaperture negative ion source attached to the multiaperture accelerator tube it uses an original scheme with the single-aperture accelerator spaced apart from the multiaperture ion source. The vacuum tank with LEBT section, containing the beam bending magnets and vacuum pumps is introduced between the ion source and accelerator. It permits to purify the accelerated negative ion beam from the gas, secondary particles and residual cesium flows from the ion source to accelerator, and to prevent the ion source illumination by secondary particles from accelerator. The experiments on negative ion beam production, transport and acceleration were produced at the BINP HV test stand, consisting of ion source, LEBT tank, acceleration tube and HEFT with calorimeter.

An efficient acceleration of negative ion beam to energy up to 330 keV were produced at the BINP test stand recently. The data on 1A negative ion beam production, its transport through the LEBT, acceleration with the single-aperture acceleration tube and following transport to the distance ~ 10 m from the source will be presented. The data on the beam transport to distances 2.5 m, 4.5m and 10m vs various source parameters will be described.

[1]. A.A. Ivanov, et al. AIP Conf. Proc. 1515, 197 (2013)

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Track Classification: Ion sources for fusion