Beam Physics in ITEP-TWAC Synchrotron Rings.

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Abstract

For plasma physics experiments in TWAC accelerator facility there are essential the following parameters of the extracted beam: kind of ions, beam energy and beam power, beam momentum spread and beam emittances (these parameters define specific energy and specific power dissipated in the experimental target). We have proposed three stages of complex upgrade directed on an improvement of the beam parameters: 1) change of the laser source on a new more powerful one; 2) development of a new linac; 3) enhancement of the booster repetition rate up to 20 Hz. For modified complex, it is considered beam physics phenomena limiting beam intensity and beam quality: space charge effects, intra-beam scattering, beam induced pressure growth in the vacuum chambers and electron cloud effects. The corresponding cures for suppression of these effects have been described. It is marked that achievement of design TWAC parameters requires significant technical and intellectual efforts.