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WARP Particle-In-Cell Framework: A powerful tool for education and research for Korean graduate students at UNIST

The Intense Beam and Accelerator Laboratory (IBAL) has been established in 2014 at Ulsan National Institute of Science and Technology (UNIST), Korea. Since then, the WARP Particle-In-Cell (PIC) framework has been actively used as a powerful tool for education and research for Korean graduate students. We have focused on three topics. 1) The first one is beam-plasma interaction for electron acceleration. The self-modulation instability (SMI) of electron beam and ionization injection schemes have been investigated. 2) The second topic is the motions of trapped charged particles in the solenoid magnet and the multi-ring electrodes. The beam which is injected into the solenoidal magnetic field will be trapped in the potential well generated by electrodes. After some beam manipulations, the trapped charged particles will be extracted from the trap with the help of electrostatic optics. 3) The third topic we have studied based on the WARP is high intensity, low and medium energy beam transports (LEBT and MEBT). Such beam transports are critical for the success of International Fusion Materials Irradiation Facility (IFMIF) and Accelerator Driven System (ADS). Using ionization module, LEBT with space-charge compensation effects can be studied. MEBT simulation is also in progress. In this talk, we will present the highlights of the WARP simulations on these three topics.

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