Contribution ID: **41** Type: **talks**

PLASMA WAKEFIELD ACCELERATION AND FOCUSING

Wednesday, January 22, 2025 5:00 PM (25 minutes)

High-efficiency acceleration of charged particle beams in the plasma wakefield accelerator was studied experimentally and by numerical simulation (see [1]-[9]). The most impressive experimental results [1] until now in electron accelerating by a wakefield, excited in a plasma, have been achieved using capillary-generated plasma. Plasma-wakefield acceleration provides high accelerating gradients [1,10], promises compact accelerators of high-brightness and high-energy electron beams. Applications of plasma-wakefield accelerators, in particular, particle colliders (see [11]) and free-electron lasers demand low energy spread beams, their small emittance, high current of accelerated bunches, large transformer ratio and high-efficiency operation. Achievement of these requires plateau formation on both the accelerating field for witness-bunch and the decelerating fields for driver-bunch. As it is known plateau formation is possible by controlled beam loading with careful shaping current profile and beam charge selection. We will demonstrate by numerical simulation by PIC code such optimal beam loading in a linear, weakly nonlinear and blowout electron-driven plasma accelerators. Beams for plasma accelerator are prepared with RF linear accelerator with high beam quality. Problems of acceleration of positron bunches in plasma, focusing and stable transport of electron and positron bunches in plasma (see [12]) are important. In the blowout regime the hose instability can appear [13].

Presenter: MASLOV, Vasyl (Deutsches Elektronen-Synchrotron DESY)

Session Classification: Session Contributed talks