

# Ion beam dynamic simulation considering interaction with residual gas

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Numerical simulation results of the charged particles beam dynamic in an ion-optical system of a miniature linear accelerator are presented. Calculations were performed in the Comsol MULTIPHYSICS software package. Ion coordinates and velocities at the ion source, obtained earlier by PIC (particle-in-cell) simulation [1,2], were used as initial data. The simulations consider ion beam interaction with residual gas: elastic scattering, ionization, resonant charge exchange, excitation [3]. Coordinate, angular and velocity distributions of the incident particles on the target and electrodes surface were the output data. Ion current density profile on the target was investigated. Ion beam dynamic simulation was performed at various combinations of pressure and accelerating voltage.

[1] [1] NV Mamedov AS Rohmanenkov et al 2019 *Rev. Sci. Instrum.* **90**

[2] IA Kanshin NV Mamedov A S N E 2022 *Vacuum* **202**

[3] VL Bylkin LA Palkina B S 1971 *J. Exp. Theor. Phys.* **32** 540