

# **Multi-stage ion acceleration in electric field of a foils irradiated by ultra-intense laser pulses**

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The schema of multi-stage Laser proton accelerator with a few targets and laser pulses is discussed. It is shown, that for optimal distance between targets monochromatic protons energy distribution is obtained. The two-stage scheme allows obtain higher acceleration efficiency and protons energy, than acceleration by one pulse with the energy equal to total energy of two pulses. By means of analytical model optimum distance between targets, second laser pulse delay time and pulse intensities are defined. Analytical model results are confirmed by 2D PIC-simulations of proton bunch, moving through laser spot on a foil surface. Such schema can significantly enhance proton energy and improve proton spectrum.