

On the way towards novel applied and fundamental physics

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I shall discuss several problems on which I am working with my colleagues. Some of the problems are related to applied physics and other problems are in the field of fundamental science. Super strong magnetic field generated in capillary discharge plasmas is suggested to use for production of flat electron bunches (for flat bunches the beamstrahlung weakens) via active lensing. We also study charged particle dynamics in multiple colliding electromagnetic waves, surveying random walk, Levy flights, limit circles, attractors and structurally determined patterns including radiative shields. The laser plasma interaction in these electromagnetic field configurations provide conditions for gamma-ray flash generation with high efficiency.