On estimation of spatial and energy characteristics of direct laser accelerated electrons in near-critical-density plasma and their synchrotron radiation

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The action of relativistically intense subpicosecond laser pulse on the near-critical-density (NCD) plasma can give rise to formation of ion channel inside the plasma and effective acceleration of background electrons [1]. Thus one can produce high current (electron charges from tens nC [1] to several μC [2]) high energy (from several MeV to several hundreds MeV [2]) electron bunches, demanded in different practical applications.

An approximate model is proposed for calculating the spatial and energy characteristics of a bunch of DLA (direct laser accelerated) electrons in the ion channel formed in the NCD plasma, as well as the characteristics describing the spectrum of their synchrotron radiation [3]. For considered example of intense laser pulse action on NCD plasma the predictions of the proposed model are in good agreement with the results of PIC (particle-in-cell) simulations. Using the proposed model one can estimate the parameters of plasmas and laser pulses necessary for obtaining electron bunches and flashes of synchrotron radiation with required characteristics.

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[3] Veysman M E and Andreev N E 2022 *Vestnik OIVT RAN* **7** 66–69