

Synchrotron radiation as a tool for diagnostic of accelerated electrons dynamic in guiding structures

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Cappillary waveguides [1] or plasma channels [2] are known as effective tools for powerfull laser pulses propagation over many Releigh length and electrons acceleration by means of laser wakefield [3], or direct laser acceleration [4] regimes. Transverse betatron oscillations of accelerated electrons in quasistationary electric fields inside a guiding structure leads to emission of their synchrotron radiation. Estimations of parameters of synchrotron radiation spectrum (it's characteristic frequencies, width and amplitude of spectral lines) can be used as a tool for diagnostic of electrons transverse motion. Particularly, it is shown, that measurements of the parameters of the synchrotron radiation spectrum can be used for diagnostic of parametric excitation of electrons betatron oscillations in guiding structures.

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- [1] Veysman M, Cros B, Andreev N and Maynard G 2006 *Phys. Plasmas* **13** 053114
- [2] Leemans W P, Nagler B, Gonsalves A J, Toth C, Nakamura K, Geddes C G R, Esarey E, Schroeder C B and Hooker S M 2006 *Nat Phys* **2** 696–699
- [3] Andreev N E and Gorbunov L M 1999 *Phys. Usp.* **42** 49–53
- [4] Pukhov A, Sheng Z M and Meyer-ter Vehn J 1999 *Physics of Plasmas* **6** 2847–2854 (*Preprint* <https://doi.org/10.1063/1.873242>)