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Generation of THz-radiation in the Cherenkov Decelerating Structure with Planar Geometry at Frequency ~ 0.675 THz

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As one of the ways THz-radiation can be generated by the relativistic electron bunches travelling through Cherenkov decelerating dielectric filling capillary channel. Sapphire and other dielectric materials for the internal surface coating of the capillary can be used. Relativistic electron bunches having ~100 μm in diameter and pulse durations of 1 ps or shorter are capable to produce substantial power of THz-radiation. The aperture of Cherenkov decelerating structure should be comparable with the sub-mm wavelength (0.05-3 mm). Such type of decelerating system allows to provide the wide range of operating parameters at the various geometrical sizes. But it is necessary to consider that such capillaries are difficult in production because there is a requirement to drill a small aperture in a long crystal having high hardness. In this regard it would be desirable to offer transition option from the axial geometry to the planar. Besides ribbon beam have some advantages as more simple focusing at low energies and possesses smaller expansion in the drift space. In this report design and results of electrodynamics study of the decelerating planar dielectric filling Cherenkov channel at frequency 0.675 THz will present. Characteristic's comparison with axial geometry channel will also delivered. A horn antenna attached to such channel at 0.675 THz resonant frequency will considered.

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