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Coherent Radiation of Relativistic Electrons in Dielectric Fibers

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The usefulness of a radiation of relativistic electrons in optical fibers in beam diagnostics was proposed by X. Artu at the symposium RREPS-11 (see also [1]). In this work the properties of different types of radiation, such as diffraction and Cherenkov radiation, induced in fibers by an electromagnetic field of relativistic electron were considered. We present in this report the results of experimental investigation of this phenomenon in millimeter wavelength region in coherent condition. The nature and properties of radiation in fibers was analyzed experimentally for different geometries of fiber position in respect to the electron beam. The radiation in flexible fiber was investigated as a function of curvature radius of the fiber. The role of surface waves in the radiation transport in fibers was experimentally analyzed on the real photon beam.

[1] X Artu, C Ray. Light induced by charged particles in optical fibers. NIM B, 309 (2013)

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