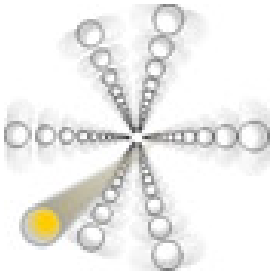

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Radiation induced by charged particles in optical fibers

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The field of a charged particle passing trough or near an optical fiber induces a transient polarization of the fiber atoms. This polarization turns into radiation, part of which is channelled by the fiber. We call it particle-induced guided light (PIGL). PIGL can also be generated by a particle passing trough or near a metallic object stuck to the fiber. This occurs via surface plasmons.

Two types of PIGL are considered, depending on whether translation invariance along the fiber axis is broken or not. Type-I occurs on a uniform part of the fiber. Type-II occurs at a fiber cut, at indentations or through metallic objects. Type-II, but not type-I, may receive background from real photons accompanying the beam.

Properties of type-I PIGL in a single-mode fiber are reviewed: intensity, spectrum, linear and circular polarizations in function of the particle velocity, impact parameter and incidence angle. Rough estimations of the Type-II PIGL intensity are given for a fiber cut or a metallic ball. Interference between regularly spaced balls leads to a guided Smith-Purcell radiation.

Application of PIGL to beam diagnostic is discussed.

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