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Terahertz Radiation from Electrons Moving through a Waveguide with Variable Radius, Based on Smith-Purcell and Cherenkov Mechanisms

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Cherenkov radiation arising when electrons pass through the hole (channel) in a target is known to be a very good source of THz radiation. In this work we explore theoretically the situation when internal radius of the channel is periodically changed. In this case Smith-Purcell radiation is added to the Cherenkov one. The expressions obtained coincide with the known ones in case of usual Cherenkov radiation, including the so called Tamm problem in it, and give the correct Smith-Purcell relation. We present the analytical and numerical analysis from point of view of enhancing the resulting radiation in THz range.

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