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Statistical fluctuations of radiation in quasi-Cherenkov generators

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Shot noise, intrinsic to electron beams, is the cause of statistical fluctuations in radiation generated by quasi-Cherenkov generators operating in stationary and non-stationary regimes. Radiated power and instability time growth are the main output parameters characterizing the dynamics of electron beam interacting via the radiation field.

Shot-noise related fluctuations of radiated power and instability time growth impose appreciable limitations on the possibility of coherent summation of electromagnetic oscillations from several quasi-Cherenkov generators operating in microwave and terahertz ranges [1,2]. The optimal conditions minimizing the spread of the main output parameters have been found for stationary and non-stationary regimes of quasi-Cherenkov generator operation.

[1] S.V. Anishchenko and V.G. Baryshevsky, Nucl. Instrum. Methods B 355 (2015) 76.

[2] S.V. Anishchenko and V.G. Baryshevsky, Tech. Phys. 61 (2016) 934.

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