# Self consistent post-amplification of a gyrotron RF beam by a sheet electron beam*

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The capability of manufacturing high power gyrotrons [1] gives the opportunity to use the Gaussian RF beam produced by a conventional gyrotron as an input for its interaction with a sheet electron beam, in the expectation of generating even higher RF power. Since the interaction takes place in the high efficiency nonlinear regime, it can proceed without the need of a resonator, and without the restrictions of mode competition inherent in a quasi-optical gyrotron configuration [2].

The nonlinearly perturbed trajectories of the test-electrons have been tabulated as function of the Gaussian field amplitude and the frequency mismatch, representing the first step to an iterative self consistency sequence. Furthermore, the radiation field, produced by the motion of the perturbed electrons, is calculated in order to determine its contribution to the initial RF field. This second step is to be repeated until convergence is eventually achieved.

The calculations performed so far have allowed us to study the radiation power amplitude and its pattern and have revealed that the radiated fields have in many cases (but not always) a Gaussian cross-section. These first results imply, that the emitted radiation would constructively add to the initial input with a considerable power gain. We are currently in the process of updating the code to accommodate a denser grid.

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**References**

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