Analysis of the 118 GHz TE$_{22,6}$ Quasi-Optical Mode Converter

- Simulation Results -

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Quasi-optical mode converters in high power gyrotrons are used for separating the electron beam and the radio frequency (RF) after the interaction. The RF-beam has to be focussed to be radially transmitted through a vacuum window. This can be achieved by a helically cut waveguide which has a perturbation on its inner wall. This is preshaping the beam to a Gaussian-like structure. Further focusing is done by metallic mirrors inside the gyrotron.

Simulations on these quasi-optical mode converters is nowadays based on the calculation of the diffraction integral. With todays computer performance a new model solving the electric field integral equations was introduced recently and showed an enhancement in the analysis of launchers. Now we expand the 3D-analysis to the complete mode converter including the launcher and three mirrors. With this tool the analysis of the 118GHz TE$_{22,6}$ mode converter was carried out.

We will discuss the basics of quasi-optical mode converters and show detailed results of the analysis of the 118GHz TE$_{22,6}$ system. This will include the behaviour of the observed double peak structure in the output beam and a proposal for a design having an fundamental Gaussian structure.