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Frankfurt am Main

Innovative planar slow wave structures for traveling wave tube amplifiers

Benefits

- **Game changing extended specifications like higher frequencies and much lower manufacturing costs**
- **Lean fabrication - batch photolithographic processes**
- **Relaxed necessities for electron beam alignment**
- **Interesting for 5G+ infrastructure systems**

Project Status

- **Prototype project started**
- **Successfull first experiments and data sets**
- **Whole TWT design based on SWS available**

Patents

- **Europ. priority patent application: EP20205436.7 filed on 03.Nov.2020**
- **International patent application WO2022096330A2**

Offer

- **Technology can be licensed or assigned**
- **Collaborations for further development welcome**

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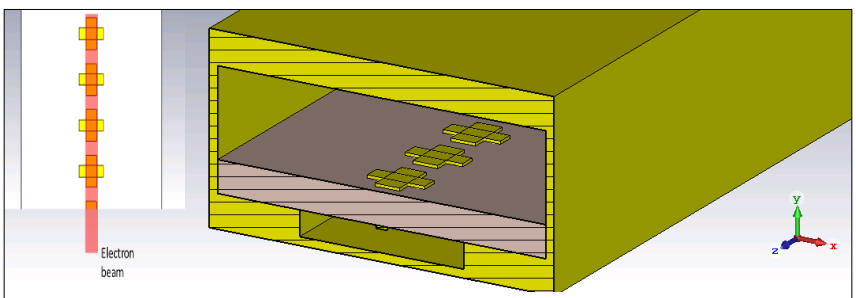
Scientists from Goethe-University Frankfurt am Main (Germany) have successfully developed a new design of planar slow wave structures that will be of great interest in the market for traveling wave tube amplifiers. Traveling wave tube amplifiers are widely used as power amplifiers and oscillators in radar systems, satellites, spacecraft transmitters and communication infrastructure

Nowadays, there is a growing need for traveling wave tube amplifiers in the high frequency range, i.e., in the V-band (50-75 GHz), in the E-band (60-90 GHz), in the W-band (75-110 GHz) and even in the D-band (110-170 GHz). The higher the frequency the higher is the atmospheric attenuation. Especially at W-band and D-band, the use of traveling wave tube instead of solid-state amplifiers is the appropriate solution thanks to their higher output power. While at V-band and E-band solid-state power amplifier solutions have already been demonstrated, the focus for travelling-wave tubes lies on the higher frequency bands likes W-band and D-Band. Especially, D-band is of great interest due to the implementation of 5G+ infrastructure systems in this frequency bands.

High frequencies allow high data rates and therefore, for example, high-data-rate communication, high-resolution radar systems or high-resolution spectroscopy. However, the higher the frequency of the electromagnetic wave gets, the smaller the dimensions of the slow wave structure have to be. This leads to a big effort in the fabrication of classic slow wave structures for high frequency electromagnetic waves.



SWS assembled inside a rectangular waveguide

The key benefit of the new innovative designs are planar slow wave structures that will be the key structures for future generations of traveling wave tubes and might represent the underlying technology for a new kind of TWTs.

In addition, the planar structures can be realized using easy batch photolithographic processes for many frequencies in one batch if required. The structures are built into waveguides with relaxed necessities for electron beam alignment and hence relaxed electron beam diameter. Therefore, the technology will facilitate game changing extended specifications like higher frequencies and much lower manufacturing costs, defining the design of a new generation of traveling wave tubes.

The Frankfurt University team would look forward to cooperate with commercial partners to transfer the invention towards industry and market exploitation.