

New Approaches towards THz Electronics

from Heterointegration to Plasmonics

Abstract

The talk addresses electronic components and integrated circuits for the frequency range between 100 GHz and 1 THz, focusing on recent work on InP-on-BiCMOS integration and new plasmonic concepts for THz emitters and detectors. The wafer-scale integration of InP heterobipolar transistors with silicon BiCMOS offers an unprecedented combination of output power capabilities and functionality on a single chip. The talk will review the semiconductor process, which is run within a cooperation between the two Leibniz institutes FBH and IHP, together with the high-frequency design issues, and present first mm-wave circuit results. The field of plasmonics has been explored since a few years only. The idea is to use high-frequency wave phenomena in the charge transport within a transistor, in order to realize a functional device at frequencies well beyond the classical limits. While for the detection case results are well established, the emitter case is still in its infancy. The talk will report recent results based on GaN structures, obtained in a collaboration between FBH and Goethe Universität Frankfurt, and sketch the perspective of the different electronic technologies in the THz field.

Presenter Biography

Wolfgang Heinrich received the Dipl.-Ing., Dr.-Ing. and habilitation degrees in 1982, 1987, and 1992, respectively, all from the Technical University of Darmstadt, Germany. Since 1993, he has been with the Ferdinand-Braun-Institut (FBH) at Berlin, Germany, where he is head of the microwave department and deputy director of the institute. Since 2008, he is also professor at the Technical University of Berlin. His present research activities focus on MMIC design with emphasis on GaN power amplifiers, mm-wave packaging, and electromagnetic simulation. Prof. Heinrich has authored or coauthored more than 250 publications and conference contributions. He served as Distinguished Microwave Lecturer for the term 2003-2005, as chairman of the German IEEE MTT/AP Chapter from 2002 to 2007, as chair of the MTT-12 Committee on interconnects, packaging, and manufacturing from 2006 through 2008, and as Associate Editor of the IEEE Transactions on MTT from 2008 until 2010. Since 2010, he is President of the European Microwave Association (EuMA).