

Title:

Millimeter-wave and terahertz photonics for LO generation and distribution in wireless communication, remote sensing and radar applications

Abstract:

Recent development of semiconductor-based photonic components and their integration technology is opening up millimeter-wave and terahertz (THz) system applications for photonics in wireless communications, remote sensing and radar. This invited talk will review the state of the art of high-output-power millimeter-wave and terahertz 1.55 μm InP photodiodes (PDs) including waveguide pin-PDs, UTC-PDs, MUTC-PD, and TTR-PDs. The talk will furthermore address the state of the art and novel integration techniques for packaging high-frequency photodiodes. The focus will be laid on broadband interfaces and packages featuring broadband coaxial connectors, such as W1, as well as the development of planar integration circuits and packages for coupling photodiodes to rectangular waveguides. Next, photonic system approaches for remote millimeter-wave and terahertz generation will be discussed, highlighting achievable output-power level and phase noise. Finally, example applications for wireless communication and sensing at millimeter-wave and terahertz frequencies employing photonics will be presented. The talk will conclude with presenting future visions for fully-integrated photonic chips for millimeter-wave and terahertz generation.



Biography:

Andreas Stöhr (M'97) received the Dipl.-Ing. and Dr.-Ing. degrees in Electrical Engineering from Gerhard-Mercator-University, Germany, in 1991 and 1997, respectively. From 1987 until 1996, he was the CEO of MS Steuerungsanlagen GmbH in Germany. From 1996 until 2013, he was a research scientist at University Duisburg (University of Duisburg-Essen). During that period, in 1998 and 1999, he also joined the Communications Research Laboratory (CRL) in Tokyo, Japan, where he worked on 60 GHz wireless systems employing radio-over-fiber (RoF) techniques. He also worked with France Telecom Orange Labs in Lannion, France, in 2009, where he developed the first complex IQ-modulated 60 GHz radio-over-fiber system. Since 2011, he is Professor and head of the Optoelectronics department within the Center for Semiconductor Technology and Optoelectronics (ZHO) at University of Duisburg-Essen (UDE), Germany. In 2015, he has been working with Corning on extremely spectral efficient millimeter-wave and terahertz (THz) RoF systems. His current research interests include III/V integrated photonic device technology and RF photonic integration technologies for millimeter-wave and THz communications, measurement systems as well as for material sensors. Prof. Stöhr has published more than 200 papers in refereed journals and conferences. He is a senior member of the IEEE Photonics and MTT society, committee member and chair of a number of international conferences and IEEE/OSA guest editor. Prof. Stöhr is also visiting Professor at the University of Ottawa, Canada.