

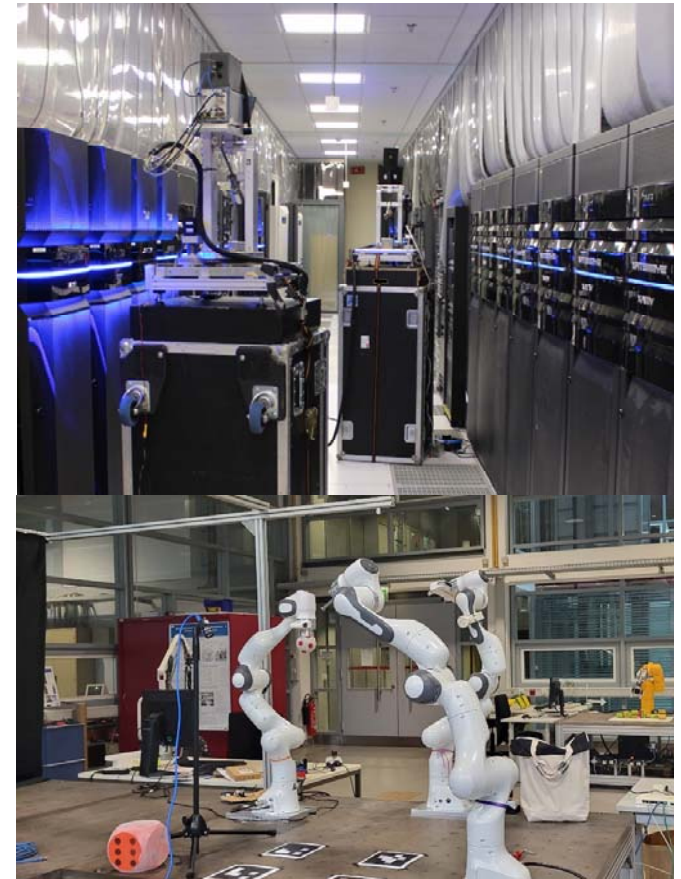


Introduction to DFG FOR 2863 Meteracom

Prof. Dr.-Ing. Thomas Kürner, Spokesman DFG FOR 2863, Institut für Nachrichtentechnik, TU Braunschweig
2nd International Workshop on Metrology for THz Communications @ GeMIC 24, Duisburg, 12 March 2024

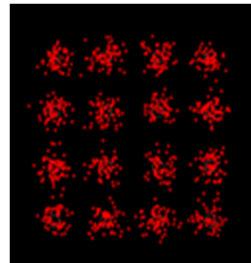
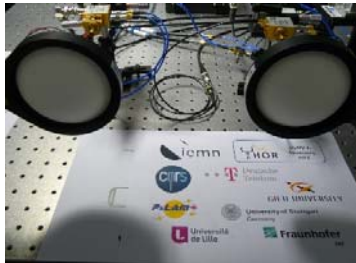
Outline

- Introduction of the DFG FOR 2863 Meteracom
 - *Why?* Motivation to work on Metrology for THz Communications
 - *What?* Project Structure
 - *Who?* Consortium
- Overview on the Workshop Program



Starting Point on THz Communications when Meteracom Phase I was submitted in 2018

- Technological progress in semiconductor technology yielded several advanced **hardware demonstrations applying** both **electronic** and **photonic** approaches
- The main findings from these demonstrations have been the following
 - **Feasibility:** The **principal feasibility** of THz communications has been **proven** and has shown its potential for future wireless transmission.
 - **Accuracy:** **Non-ideal behaviour** of system **components** and the **harsh propagation conditions** require adequate and **sophisticated measurement equipment**, procedures and algorithms to **calibrate the measurement equipment** and perform measurements
 - **Real-time performance:** **Measurements** enabling the **functionality of THz communications** (e.g. **Device discovery, beam-tracking and beam-switching**) will be **highly demanding** due to factors such as the **high carrier-frequency**, the **ultra-high bandwidth** or both.



Motivation for Metrology for THz Communications



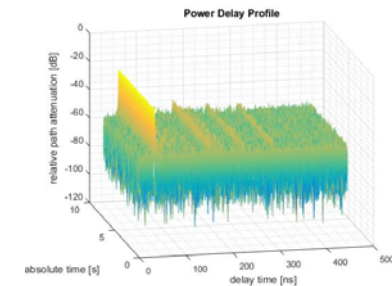
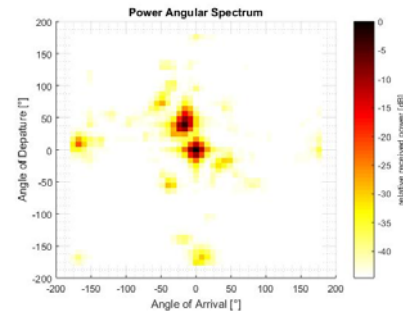
- Metrology at THz frequencies was still in its infancy and only covers detector calibration to characterization of ultrafast devices and to measurement uncertainty analysis of different spectrometer types available at THz frequencies.
- But how about **Metrology for THz communications?**



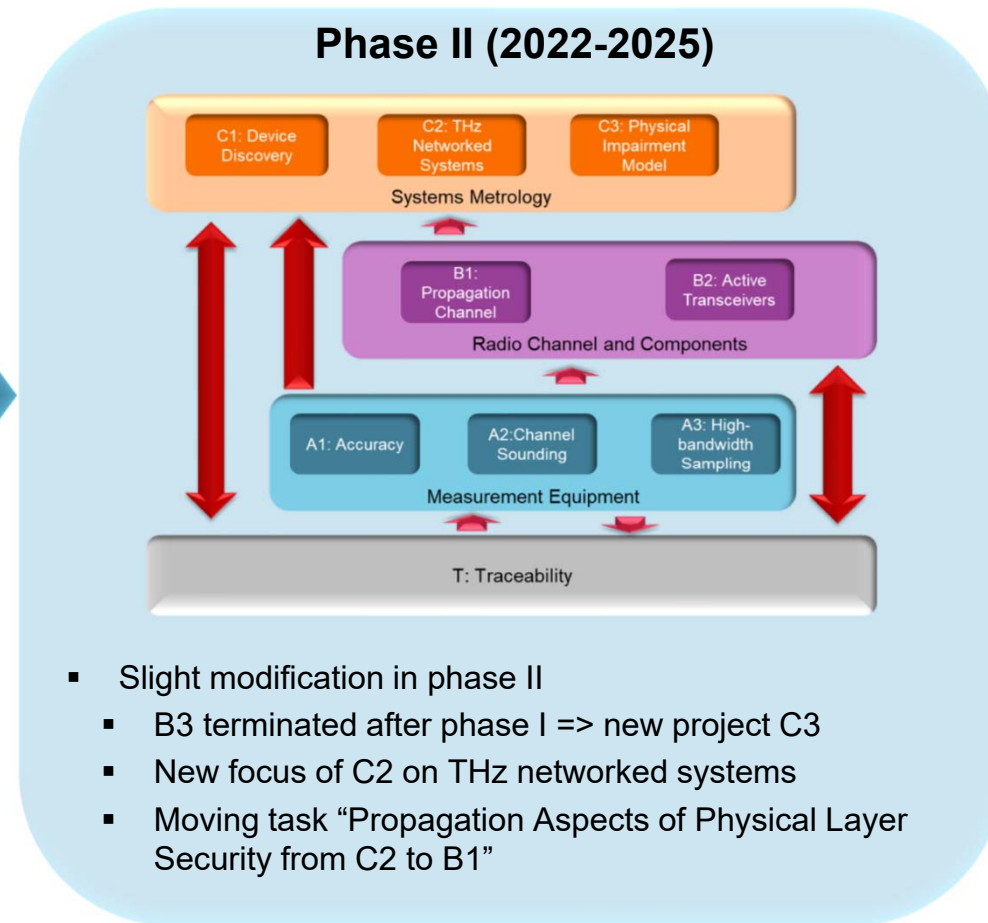
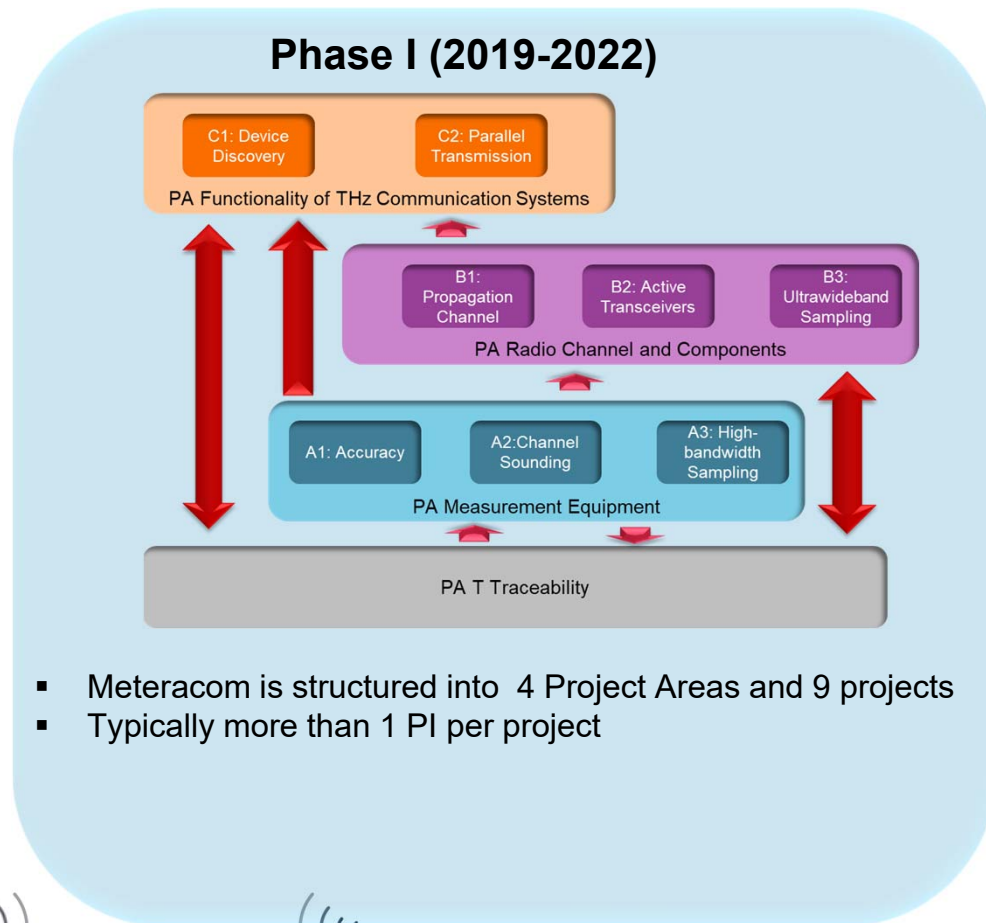
Challenges for Metrology of THz Communications

- From the main findings mentioned above it is obvious that **the capability to performing measurements and evaluating these measurements** in a proper way are **crucial for the advance of THz communication systems**.
- Meteracom addresses the **grand challenge of metrology in THz communications** systematically and in **four distinct project areas** :

- Project Area T: Traceability to the International System of Units (SI)
- Project Area A: Characterisation of the measurement system itself
- Project Area B: Metrological characterisation of the RF components and the propagation channel
- Project Area C: Measurements required for enabling the functionality of THz communications.



Project Structure



Meteracom Consortium

- Interdisciplinary and distributed research unit
- 10 (9*) Principal Investigators from 6 universities and PTB
 - New in phase II: **Giovanni Del Galdo** (TU Ilmenau)
- 2 (1*) Mercator Fellows from NPL (UK) and Brown University Rhode Island (USA), respectively
 - New in phase II: **Dan Mittleman** (Brown University)
- Spokesman: Thomas Kürner (TU Braunschweig)

* Phase I



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Overview on the Workshop Program

08:40 – 08:50	<i>Thomas Kürner, Technische Universität Braunschweig, Germany:</i> Introduction to DFG FOR 2863 Meteracom
08:50-09:20	<i>Gerhard Rösel, Rhode & Schwarz</i> External Key Note Talk: Tracing millimeter waves: Unlocking THz Communication's Potential with Accuracy in Basis RF Parameters
09:20-09:40	<i>Dominik Wrana, Universität Stuttgart, Germany:</i> Characterization of RF Impairments in Analog Electronic THz Frontends
09:40-10:00	<i>Mohanad Al-Dabbagh, PTB, Germany:</i> Traceability challenges for sub-THz channel sounding
10:00-10:20	<i>Jonas Gedschold, Technische Universität Ilmenau, Germany:</i> Channel Sounder Architectures for Performance Evaluation of THz Systems
10:20-10:40	Coffee break

10:40-11:00	<i>David Humphreys, Mercator Fellow, UK:</i> Progress towards traceability for THz communications waveforms and the use of „data enabled analysis“ in testing
11:00-11:20	<i>Maxim Weizel, Paderborn University, Germany:</i> Photonically Assisted Sampling Circuits
11:20-11:40	<i>Thomas Schneider, Technische Universität Braunschweig, Germany:</i> Review of Orthogonal Sampling for Terahertz Signal Processing
11:40-12:20	<i>Thomas Kürner (Moderator), Gerhard Rösel, Thomas Kleine-Ostmann, Ingmar Kalfass, Thomas Schneider, David Humphreys:</i> Panel Discussion: What are the big challenges in Metrology to make THz communications happening?



Thank you very much for your Attention



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