

CWTe Research Retreat 2023

Opening and Introduction

Sonia Heemstra de Groot
25 October 2023

Welcome

to the 14th CWTe Research Retreat



Invitation

CWTe 2023 Research Retreat

CWTe
CENTER
FOR WIRELESS
TECHNOLOGY
EINDHOVEN

TU/e

Wednesday, 25th of October 2023
Zwarte Doos, 1st floor, TU Eindhoven

Hosted by: Center for Wireless Technology Eindhoven

- | | | |
|-------|---|--------------------------------|
| 09.15 | - Welcome with coffee | |
| 09.50 | Opening and introduction | Sonia Heemstra de Groot (TU/e) |
| 10.00 | The Way Ahead in Wireless Technology – A CWTe Perspective | Ulf Johannsen (TU/e) |
| 10.30 | What a package !? | Oliver Maiwald (Sencio) |
| 11.00 | - Break | |
| 11.30 | Integrated Circuits for Communications after the Happy Scaling Era | Andreas Burg (EPFL) |
| 12.00 | Packaging and integration of antennas and chips at millimeter-wave and beyond | Piyush Kaul (TU/e) |
| 12.30 | Lunch break | |
| 13.45 | Poster pitches | various speakers |
| 14.30 | - Break | |
| 15.00 | Quality-of-Service-Adequate Design | Paul Detterer (imec) |
| 15.30 | The evolution of Wireless Communication is shaking up Test And Measurement! | Marc Vanden Bossche (NI) |
| 16.00 | Closing words | Chair (TU/e) |
| 16.10 | - Drinks | |
| 17.00 | - End | |

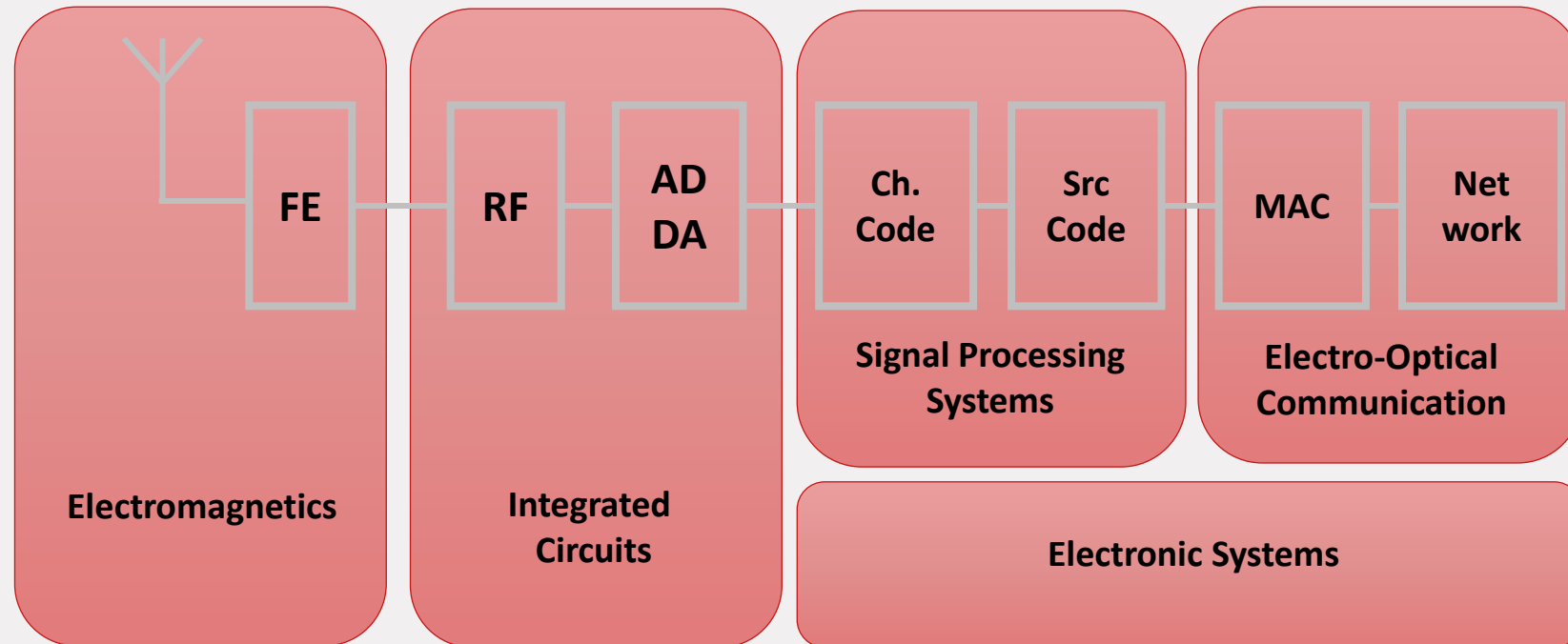
For registration: www.tue.nl/cwte



Center for Wireless Technology Eindhoven

© 2015 Bart van Overbeeke fotografie

CWTe

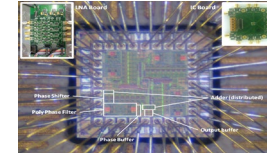


CWTe Research Programs



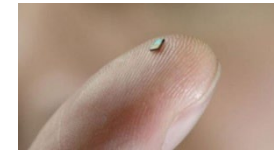
Ultra-high data rates (Chair: Dr. Sander Bronckers)

- High Frequencies (≥ 26 GHz) and very high data rates (1Tbps)
- Smart antenna systems, phased arrays, optical wireless
- Next generation RAN (cell-free M-MIMO, non-terrestrial networks)



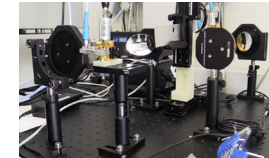
Ultra-dense ultra-scale AI-driven networks (Chair: Dr. George Exarchakos)

- Ultra small, ultra-low power and battery-less wireless systems
- Self-configuring networks, autonomous devices and AI
- High-reliability and ultra-low latency



Ranging and sensing (Chair: Dr. Dook van Mechelen)

- Accurate, cheap, low-energy, one-chip radar
- Sensing and positioning (3D, under water)
- All frequency bands



Radio Astronomy (Chair: Prof. Mark Bantum)

- Next generation radio telescopes
- Large antenna arrays
- Low frequency (< 30 MHz)



EM

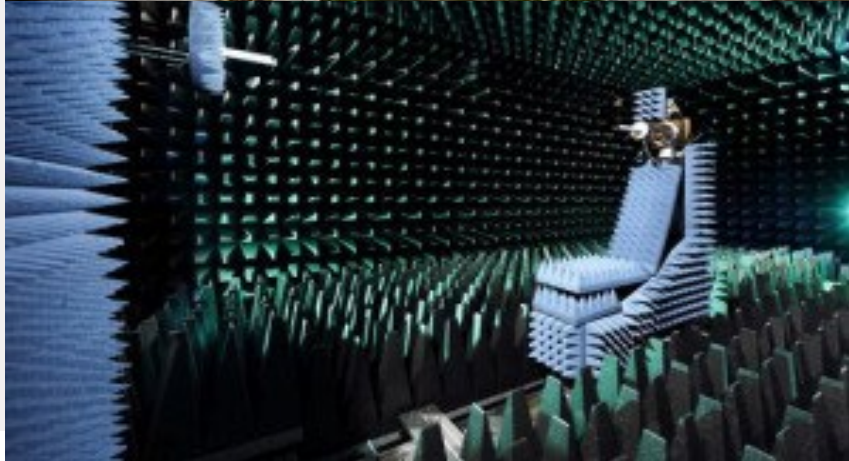
IC

ES

SPS

ECO

CWTe Labs in Flux



- Co-located and integrated laboratories, occupying about 700m² Labs for all different sub-disciplines of wireless systems
- Fully shielded
- Anechoic chambers
- On-wafer and PCB-level characterization
- 5G test bed and massive MIMO setup

CWTe Research Retreat



CWTe Highlights 2023

Running projects (1)

- EU

- PENTA HEFPA
- PENTA InnoStar
- ECSEL NextPerception
- ECSEL DAIS
- **KDT HiCONNECTS***
- **KDT LoliPop***
- **Xecs MID4automotive***
- HE MSCA-DN ANTERRA
- **HE MSCA-DN SCION***
- HE ADENEAS
- HE ETAIN



**Started in 2023*

Running projects (2)

- TKI

- HTSM Mi-RAYS
- HTSM RAISE
- HTSM RAIDAR
- HTSM Smart-One
- TSH RHIADA

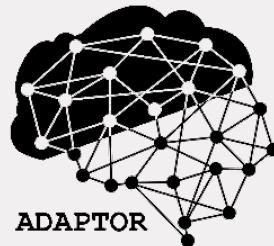


Rijksdienst voor Ondernemend
Nederland



- NWO OTP

- ADAPTOR
- SHARE-WAVES
- FreePower
- **5G+Weather***
- **3D-ComS***
- **BIT-FREE***



**Started in 2023*

Running projects (3)

- **NWO Wetenschappelijk Infrastructuur PHARA¹**
- **NOP Turkish Government¹**
- **National Growth Fund²**
 - Aerospace in Transition <https://luchtvaartintransitie.nl/>
 - Polaris
 - Future Network and Services



Rijksoverheid



**24 running projects, 3 NGF starting, 54 Ph.D.s,
14.5 PDs, 6 EngD**

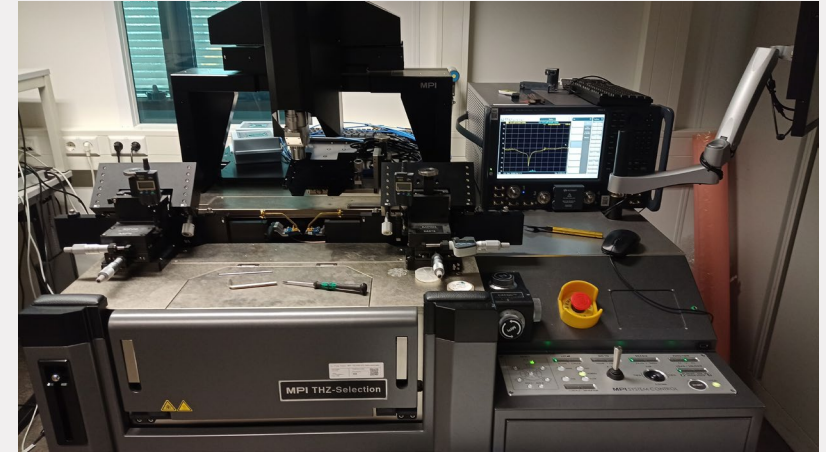
¹Started in 2023

²Starting in 2024

CWTe laboratories

Lab upgrades towards 6G

- Measurements of complex S-parameters and spectra up to 500 GHz
- THz set-ups that can go up to 7THz
- Optical wireless communication testbed
- Networking lab equipment for distributed massive MIMO
 - 16 channels 0.4-4.4 GHz up to 40MHz BW (with possibilities to expand to mmWave).



Probe station and network analyzer



Massive MIMO set up

Spin-off AntenneX

In-house antenna measurements and material characterization up to 140 GHz

<https://antennex.tech/>



The team



mmwave antenna analyzer

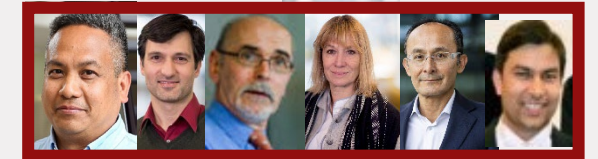
Dissemination

- Bi-monthly colloquia
- Research Retreat
- Symposia
 - **Closing MyWave project with 6G Symposium - 15 Sept**
- In the news: newspapers, many radio/ TV appearances
- Several MOOCs courses
 - Microwave Engineering and Antennas (Coursera)
 - RF and millimeter-Wave Circuit Design (Coursera)
- Standardization
 - 6G - IA membership (EU Smart Networks and Services WP)
 - EUROCAE WG-96

CWTe Team

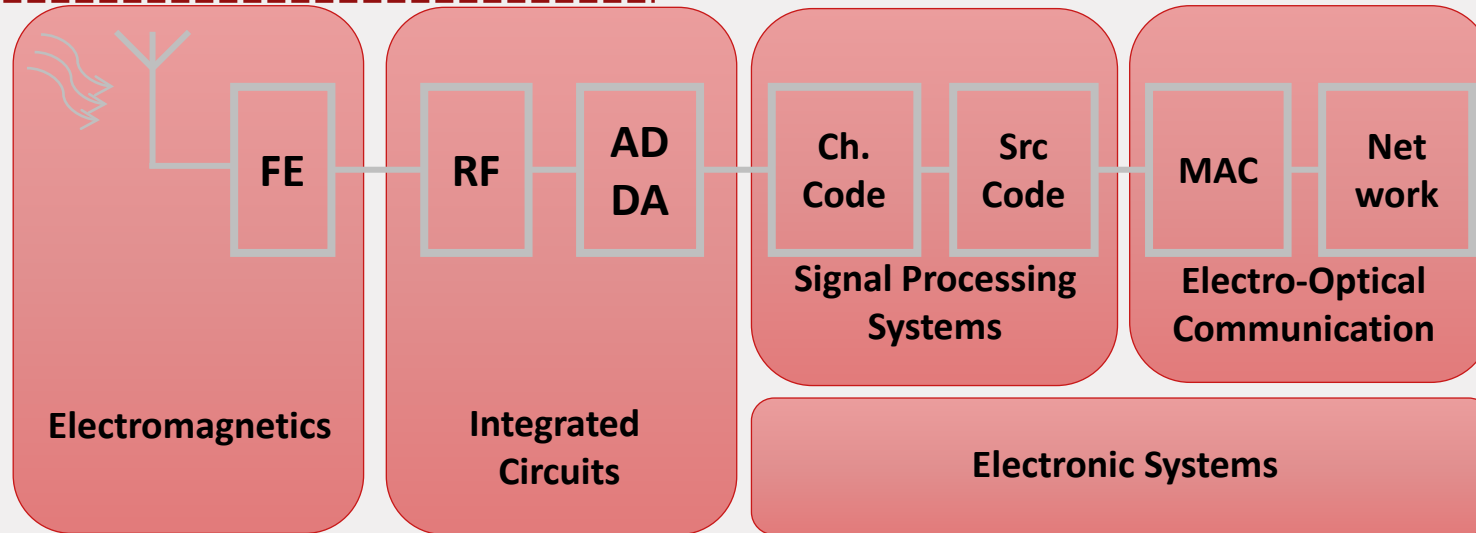


SPS



ECO

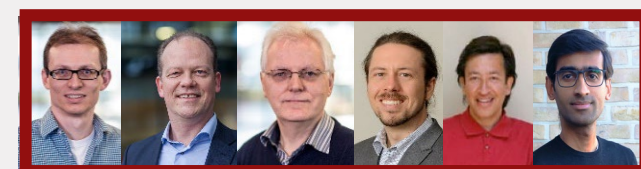
MT



EM



IC

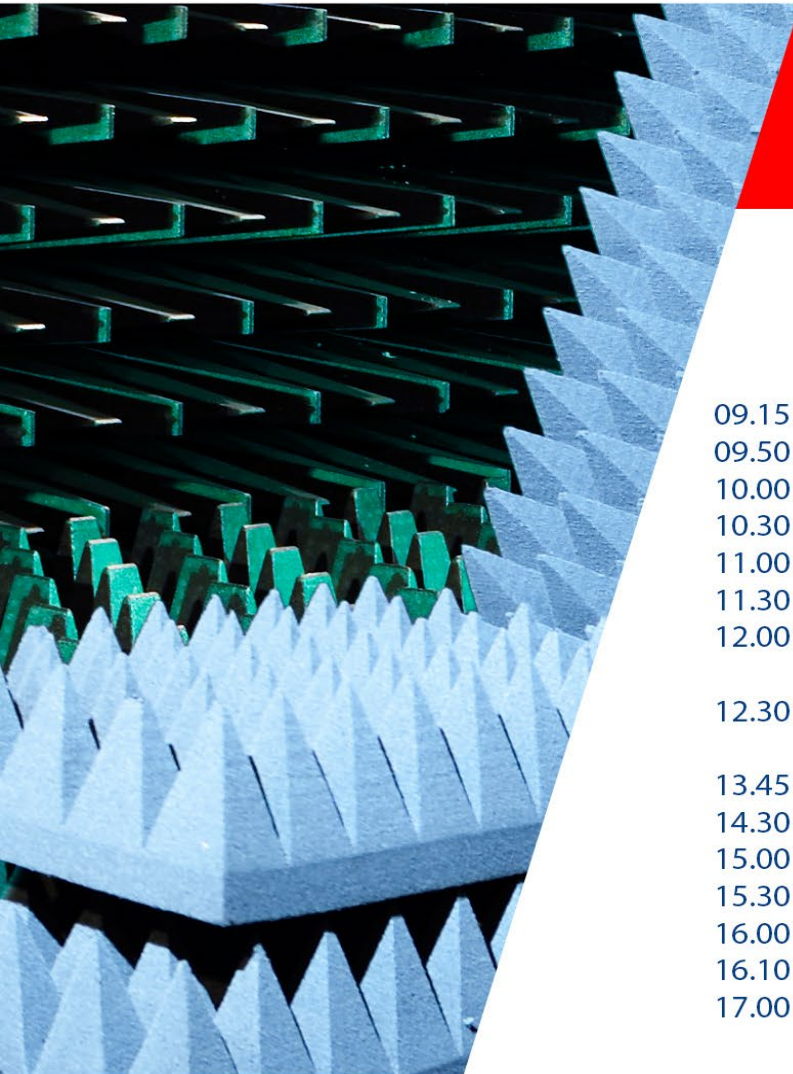


ES

New CWTe Director!



Dr. Ulf Johannsen



Invitation

CWTe 2023 Research Retreat

CWTe
CENTER
FOR WIRELESS
TECHNOLOGY
EINDHOVEN

TU/e

Wednesday, 25th of October 2023
Zwarte Doos, 1st floor, TU Eindhoven

Hosted by: Center for Wireless Technology Eindhoven

- | | | |
|-------|---|--------------------------------|
| 09.15 | - Welcome with coffee | |
| 09.50 | Opening and introduction | Sonia Heemstra de Groot (TU/e) |
| 10.00 | The Way Ahead in Wireless Technology – A CWTe Perspective | Ulf Johannsen (TU/e) |
| 10.30 | What a package !? | Oliver Maiwald (Sencio) |
| 11.00 | - Break | |
| 11.30 | Integrated Circuits for Communications after the Happy Scaling Era | Andreas Burg (EPFL) |
| 12.00 | Packaging and integration of antennas and chips at millimeter-wave and beyond | Piyush Kaul (TU/e) |
| 12.30 | Lunch break | |
| 13.45 | Poster pitches | various speakers |
| 14.30 | - Break | |
| 15.00 | Quality-of-Service-Adequate Design | Paul Detterer (imec) |
| 15.30 | The evolution of Wireless Communication is shaking up Test And Measurement! | Marc Vanden Bossche (NI) |
| 16.00 | Closing words | Chair (TU/e) |
| 16.10 | - Drinks | |
| 17.00 | - End | |

For registration: www.tue.nl/cwte