Center for Wireless Technology Eindhoven (CWTe)

2026 Research Retreat

October 29, 2026

Abstracts of the talks and speakers' bios:

Challenges in base station transmitters - Fred van Rijs (Ampleon)

Abstract:

This presentation addresses the rapidly increasing performance demands for new base station systems e.g. for 6G and what is needed for new technologies and design concepts to meet these requirements.

Speaker's bio:

Fred van Rijs studied electrical engineering, including PhD degree at the technical University of Delft. He started in 1992 at Philips Research Laboratories in Eindhoven on advanced silicon technologies such as SiGe HBT's. Later he moved to Philips Semiconductors in Nijmegen, which turned into NXP Semiconductors and was there responsible for the development of LDMOS technology for base station RF power amplifiers. Currently, he is working at Ampleon on advanced technologies such as GaN required for future RF power applications.

From multi-sensor satellite data to ground decisions: the fusion advantage in mineral exploration and ESG monitoring - Tim van der Lee (Terraprisma)

Abstract:

Terraprisma is an ESA BIC incubated startup building AI-driven geospatial intelligence for the mining sector, turning satellite data into exploration targets and ESG baselines before fieldwork begins.

This talk offers a perspective from the application end of the Earth Observation sensing chain. We draw on a multitude of satellite imagery inputs (InSAR, hyperspectral, and multispectral) alongside other datasets. Radar is especially valuable where multispectral and hyperspectral sensors fall short, such as under persistent cloud cover, dense vegetation, or in arid terrains with low spectral contrast. No single sensor is sufficient, so we fuse these complementary and independent measurements to surface geological and environmental signal that none reveals on its own. We illustrate the idea with concrete applications: accelerating and de-risking early-stage mineral exploration, and establishing long-term ESG baselines with near-real-time monitoring of land, water, and biomass.

Speaker's bio:

Tim van der Lee works at the intersection of telecommunications, satellite systems, and remote sensing. He holds a Ph.D. from Eindhoven University of Technology, where his research addressed distributed intelligence and communication protocols in constrained, networked systems.
His work spans the full pipeline from space-based sensing to actionable data. At SES, he developed modelling and simulation tools for next-generation satellite constellations, studying how optical inter-satellite links and multi-orbit architectures shape network performance. He has also contributed to European space initiatives such as IRIS².

As CTO of Terraprisma, Tim now applies this background to Earth observation and remote sensing, building the geospatial processing pipelines and analytics that turn satellite and sensor data into insight for real-world applications. His interests bridge the technical layers of the field, from the space and communication systems that acquire data to the software and algorithms that make it meaningful.

Terahertz in Industry: Technology and Application - Maris Bauer, Daniel Molter, and Joachim Jonuscheit (Fraunhofer ITWM)

Fraunhofer ITWM, Department of Materials Characterization and Testing, DE-67663, Kaiserslautern, Germany

Abstract:

Terahertz technologies have been in development and application for a long time, mostly in scientific contexts. One of the main reasons for this was the novelty of this field of research and development, which naturally competed with other, more established techniques in relevant fields of application. However, in recent years, a number of terahertz measurement technologies have successfully transitioned from scientific research to industrial applications. Core system components such as terahertz sources and detectors, quasi-optical components, and so on have become increasingly efficient and compact, and unit prices have dropped to the point where industrial applications are financially attractive.

At Fraunhofer ITWM, part of the Fraunhofer Society, our applied research and development focuses on terahertz technologies for real-world industrial applications. In particular, we implement techniques of non-destructive testing (NDT) with terahertz technology in industrial environments, addressing not only terahertz equipment and measurements, but also typical challenges encountered in industrial settings. In this contribution, we present several specific projects in which terahertz technology has already been successfully implemented in industrial processes. We present several terahertz technologies, such as time-domain spectroscopy (TDS), which is mainly used for layer thickness measurements, as well as all-electronic terahertz frequency-modulated continuous wave (FMCW) radars, which are mostly used for defect detection and quality inspection, and some recent optoelectronic approaches. We also demonstrate initial steps towards the machine learning-based optimization of measurement processes and automated data evaluation to support industrial tasks.

Acknowledgements:

We would like to thank all our colleagues, both within and outside Fraunhofer, who have contributed to the work presented here over the past few years. We would also like to thank the national and international funding agencies that have supported some of the technological developments presented here.

Speaker's bio:

Dr. Joachim Jonuscheit has been business development manager and head of department in the „Materials Characterization and Testing“ (MC) department. The department develops terahertz systems and industrial applications based on optical and all-electronic approached.

He graduated in Physics at the Ludwig-Maximilians University of Munich and received his PhD degree from the University of Erlangen-Nuernberg.

He worked at various laser companies for several years in several management positions (project manager, R&D manager and production manager).

He holds several publications in peer-reviewed journals, patents, and book chapters in the laser and terahertz field.

IC to antenna interfaces for high-performance automotive mm-wave radars
- Harish Nandagopal (NXP)

Abstract:

Automotive radar systems are evolving towards Level 3 and Level 4 autonomous driving, where the radar sensors are expected to deliver longer detection ranges, finer angular resolution, and increasingly detailed environmental perception. Meeting these requirements demands larger antenna apertures, higher channel counts, and improved link budgets, while maintaining the stringent power and cost targets required by automotive platforms. As a result, minimizing RF losses becomes increasingly critical since every decibel lost between the transceiver and the radiating aperture directly impacts power efficiency, thermal performance, and sensing range. These challenges become more pronounced as radar systems scale in complexity and aperture size. This talk examines the architectural implications of this emerging bottleneck and explores new approaches for realizing the next generation of high performance automotive radar sensors.

Speaker's bio:

Harish Nandagopal received his M.Sc. in Communication Technology, specializing in Microelectronics, from Universitaet Ulm, Germany, in 2011. That same year, he began his career at Infineon Technologies in Linz, Austria, as a Concept and Applications Engineer focussing on automotive radar. In 2015, he joined NXP Semiconductors in Eindhoven, the Netherlands, where he worked on the first 77-GHz CMOS automotive radar product. He is currently a Senior Principal Design Engineer, driving advanced RF and millimeter-wave innovation for next generation automotive radar systems. With more than a decade of experience in RF and millimeter-wave engineering, Harish has helped translate complex high-frequency concepts into deployable semiconductor solutions for 76 to 81 GHz radar platforms. He has actively contributed to innovation through multiple patent applications and publications in RF, millimeter-wave, and antenna engineering.

Made in Space
- Darren Cadman (Space Forge)

Abstract:

Space Forge is an advanced material manufacturing company that is aiming to take advantage of the benefits of in space production of crystals - specifically, semiconductor crystals. This presentation will give a history of the research and science, rationale and how Space Forge plans to realise its ambitions.

Speaker's bio:

"Darren has over 25 years' experience of business and research management within the electronics manufacturing, semiconductor and RF industries. He has been involved with the full range of technology maturity levels, from fundamental research through to volume production."

Heterogeneous Integration: combining scales, materials, technologies and departments
- Olaf van der Sluis (Casimir Institute)

Abstract:

This presentation first discussed the Casimir Institute including relevant links to heterogeneous integration and advanced packaging. Heterogeneous integration brings together materials, devices and disciplines across widely different scales. To illustrate this, several relevant research examples will be shown which focus on some of the key characteristics of 'systems-in-package': (i) multiple materials and interfaces with a huge variety in properties, (ii) a large range in dimensions, (iii) numerous manufacturing and assembly steps, (iv) complex three-dimensional geometries, (v) a wide diversity in test and usage conditions, and (vi) many critical failure modes. Typically, these products are designed towards their primary function(s), such as ultra-precise positioning or computing performance. As a result, secondary characteristics, such as reliability and manufacturability, are not optimally designed for. Combining research on primary and secondary functionalities will enable the design of reliable systems with optimal performance.

If time permits, the strategic cooperation with ASML will be discussed, including examples and how to get (more) involved.

Speaker's bio:

Olaf van der Sluis obtained his PhD in continuum-based multi-scale modelling of materials in 2001 at TU/e (ME). In 2001, he joined Philips CFT working on various topics such as fracture mechanics of semiconductors. In 2011, he joined Philips Research where he had several roles (senior scientist, competence leader, group leader). He was involved in or in charge of several EU-funded research projects. Between 2010 and 2023, he was a part-time professor at TU/e. In 2024, he returned to TU/e as a full-time associate professor where he is leading the group 'Materials and Interfaces in High-Tech Systems' (ME). In addition, he is head of science 'High-Tech Equipment' in the Casimir Institute, co-chair of the ASML-TU/e strategic cooperation and a visiting professor at ASML Research.