

# Short Course on Wireless THz Communications

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# What Are These Lectures About?

**Photonics 2018** is focussed — among many other subjects — on Integrated Optics, Optoelectronics, Terahertz Photonics, Plasmonics, and on Networks.

**These 3 Lectures** introduce you to wireless THz transmission. We start with the rationale of using THz frequencies, and the peculiarities involved. We then talk about the generation, transmission and reception of high data rates over “long” distances up to 1.1 km.

**The Comprehension** of advantages and issues of wireless THz transmission is facilitated by asking the questions:

- What is the THz frequency range?
- Why are these “T-waves” interesting?
- Why are T-waves different from RF and optical waves?
- What T-wave sources and detectors are available?
- What are the typical application scenarios?



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**T-wave propagation and T-wave components** determine the performance of wireless THz transmission. This leads to the questions:

- How are T-waves guided and radiated?
- How are T-waves electronically generated and detected?
- How are T-waves optoelectronically generated?
- How are T-waves optoelectronically received?
- How does a plasmonic internal photoemission detector work?



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**Wireless T-wave transmission systems** have advantages and limitations. This leads to the questions:

- What are practical T-wave transmitting powers and linewidths?
- What is the sensitivity of T-wave receivers?
- What is the reach & capacity of T-wave transmission?
- What can be done to increase reach & capacity?
- What is the future of T-wave transmission?



# Wireless THz Transmission — Outline of Lectures

## I. T-wave technology and applications

What are T-waves? Why do we need them?

Generation and detection technologies

Application scenarios

## II. T-wave propagation and components

Waveguides, antennas, and free-space propagation

Electronic integrated circuits and Schottky diode

Photomixing with PC, UTC-PD or PIPED

## III. Wireless T-wave transmission

Coherent vs. incoherent transmission

Optoelectronic vs. electronic generation and reception

Frequency and mode division multiplexing

## Summary



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# What Have You Learned?

Advantages and issues of wireless THz transmission were discussed.

You should now be able to answer the questions:

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## T-wave Propagation and Components



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    - Frequency and mode division multiplexing
- Summary and [further reading \(xx citations\)](#)



# End of Photonics 2018 Short Course

