

Electro-Optics and Photonics Seminar

Monday, March 2, 2020, 2 p.m., FH 568

## **ATMOSPHERIC OPTICS**

### **The influence of the atmosphere on optical waves**

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#### **Abstract**

Optical sources and / or sensors are widely used in many different systems, ranging from cameras to Lidar to optical communication systems, for a wide variety of tasks such as: imaging (observation / detection), remote sensing, communication, etc. When these systems are deployed in the open air, the atmosphere can be a huge limiting factor in the performance of such a system. The optical wave propagates through the atmosphere and is perturbed by small particles via absorption and scattering as well as fluctuations in the refractive index. These processes cause propagation effects like refraction, optical turbulence, and transmission losses, which in turn are responsible for distortions in images (e.g. blurring, scintillation) and in laser beams (e.g. beam spreading, beam wander, irradiance fluctuations, and loss of spatial coherence). Through characterization of the atmosphere and by studying, experimentally as well as theoretically / numerically, the propagation of optical waves through the atmosphere a better understanding of the influence of the atmosphere on the above-mentioned effects can be gained. In this talk I will illustrate some of the problems that are encountered in different applications and what can be done to (partially) correct for the atmospheric distortions using techniques like image processing and manipulation of laser beams.

#### **Brief Biography**

Miranda van Iersel is an Associate Research Scientist at the University of Maryland, College Park, MD. She studied physics at the Catholic University in Nijmegen, the Netherlands, and received her MSc. degree in theoretical physics in 1999. She received her PhD degree in theoretical physics from the Vrije Universiteit in Amsterdam in 2004 and continued to work as a researcher at the Vrije Universiteit in Amsterdam until 2006. In 2006 she joined TNO, the national research laboratory in the Netherlands, as a research scientist. From 2009 – 2012 she was a visiting scientist at the École Centrale de Nantes, France. In 2018 she became a visiting research scientist at the University of Maryland, College Park, MD. For more than 13 years Miranda has been working in the area of atmospheric optics. Current active research areas include atmospheric turbulence, full and partial coherent laser beam propagation through the atmosphere, optical communication, and atmospheric characterization.