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Optical Turbulence and its impact on Free Space Optical Communications

Dr. Italo Toselli – *Fraunhofer IOSB Ettlingen, Germany*

Tuesday 27 April 2021

11:30 – 13:00 POLITO Virtual Classroom

(If you are interested to participate, please send an email to roberto.gaudino@polito.it, and he will send you the link to the Virtual Classroom a few minutes before the seminar will start)

Several applications (free space optical communications, underwater communications, directed energy, lidar) involve laser beam propagation in a medium (atmosphere or/and water). Temperature fluctuations in such a medium turn to index of refraction fluctuations, also known as optical turbulence. Optical turbulence causes deleterious refraction and diffraction effects on laser beams (scintillation and beam wander) which have an impact on optical system performances in terms of probability of fade, signal-to-noise ratio and bit-error-rate. In this seminar I will discuss the basics of all those turbulence-induced effects and how they negatively impact on Free Space Optics (FSO). In addition, I will show you our on-going research activity on free space optics (optical communications through the atmosphere and underwater) at Fraunhofer IOSB (Germany).

Dr. Italo Toselli works in the Adaptive Optics Group at Fraunhofer IOSB in Ettlingen, Germany. He received his M.Sc. (2002) in Electronic Engineering from the University of La Sapienza (Italy) and his Postgraduate Master in Information Technology (2002) from the Cefriel-Politecnico di Milano (Italy), followed by his Doctorate (2008) in Electronics and Communication Technology from the Politecnico di Torino (Italy). Before starting his doctorate, he was an officer in the Italian Navy. During his doctorate he spent more than two years at the University of Central Florida, Orlando, where he worked with Professors Larry C. Andrews and Ronald L. Phillips. From January 2010 to October 2011 he held a postdoctoral position with the National Research Council at the Department of Mechanical and Aerospace Engineering, Naval Postgraduate School, Monterey, California. From September 2013 to June 2014 he was an ERCIM Marie Curie Fellow at the same institute where he is currently employed (Fraunhofer IOSB). From June 2014 to May 2017, he was a researcher at the Department of Physics at the University of Miami, Florida, before returning to Fraunhofer IOSB. Dr. Toselli is co-author of about 40 journal and technical articles dealing with the propagation of laser beams through random media, and he is a reviewer of the most important journals in the field of oceanic and atmospheric propagation. He has been an invited speaker at SPIE and OSA conferences.

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