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Distributed Optical Fiber Sensing: Imaging the World Through Light Scattering

Wednesday, March 18, 2026 10:10 AM (20 minutes)

Optical fibers can act as continuous sensors, turning guided light into a tool to measure temperature, strain, and vibration along their entire length. Originally developed for large-scale monitoring of structures and the environment, distributed fiber sensing has recently advanced to millimeter-scale spatial resolution, opening the door to high-resolution, minimally invasive measurements in new contexts and previously inaccessible scenarios. This talk outlines the physical principles behind distributed optical sensing and discusses how concepts common to imaging, such as scattering, resolution, and signal-to-noise, reappear in this different but complementary optical framework.

1 Wilfried Blanc; Luca Schenato; Carlo Molardi; Luca Palmieri; Andrea Galtarossa; Daniele Tosi. Distributed fiber optics strain sensors: from long to short distance. Comptes Rendus. Géoscience, Glass, an ubiquitous material, Volume 354 (2022), pp. 161-183. doi: https://doi.org/10.5802/crgeos.129
2 Palmieri, L.; Schenato, L.; Santagiustina, M.; Galtarossa, A. Rayleigh-Based Distributed Optical Fiber Sensing. Sensors 2022, 22, 6811. https://doi.org/10.3390/s22186811

Luca Schenato graduated with honors from the University of Padua in 2003 as the best engineering candidate of the year (awarded with the Sarpi Gold Medal 2002/2003) and obtained his PhD in Electronic and Telecommunications Engineering in 2007 from the same institution. Over the years, he has held several positions in academia, including postdoctoral researcher at the Department of Information Engineering at the University of Padua and Researcher at the National Research Council. He is currently an associate professor of Electromagnetic Fields in the Department of Information Engineering at the University of Padua. Throughout his career, he has published over 170 papers in peer-reviewed international scientific journals, presented at international scientific congresses, authored 4 book chapters, and held 2 patents. Schenato's research interests are broad, but his main areas include the development and application of optical fiber sensors, also for industrial and civil applications.

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