

Supercontinuum Light: Fundamentals and Emerging Directions

Abstract : This lecture will introduce and review the fundamental physics of Supercontinuum generation in optical fibers and nonlinear waveguides, from ultrafast pulse propagation and dispersion engineering to ultrabroadband coherent light sources. The course will cover the key physical mechanisms underlying supercontinuum formation, including Kerr nonlinearity, soliton dynamics, modulation instability, Raman effects, optical wave breaking, and dispersive-wave emission. Recent advances in ultraviolet and mid-infrared supercontinuum sources, multimode and spatiotemporal nonlinear dynamics, bandwidth and noise optimization, and temporal reflection phenomena will also be discussed, together with emerging applications and future directions in nonlinear photonics.



Lecturer: Thibaut Sylvestre is Research Director at CNRS, based at the FEMTO-ST Institute (Université Marie et Louis Pasteur) in Besançon, France. He previously led the nonlinear photonics group (2010–2020), and his research focuses on laser physics and nonlinear optics in optical fibers and integrated waveguides. His work explores nonlinear light–matter interactions in specialty fibers, photonic crystal fibers, nanofibers, and microresonators, with applications to supercontinuum generation, fiber lasers, optical parametric amplification, Raman and Brillouin scattering, and ultrafast nonlinear dynamics. He has supervised more than 17 PhD students and teaches

advanced nonlinear photonics at Master’s and PhD level. He is a Fellow of OPTICA, and a member of SPIE and the French Optical Society (SFO), among others.