



## Juan P. Torres (ICFO)

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ICFO Auditorium

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### **"The physics of Optical Coherence Tomography"**

#### Abstract:

Optical Coherence Tomography (OCT) is a powerful imaging technique that allows to see inside objects generating high-resolution 3D images. OCT is an active area of research as well as a mature technology that finds applications in many areas of science and technology. OCT has become a standard of care in ophthalmology. OCT is an example of an idea that went from the realm of basic research to commercial application. The combination of tools invented in the XIX century (Michelson interferometer), physical concepts developed during the second half of the XX century (the interplay between optical coherence and interference), and new photo-detection schemes (high-resolution spectrometers), allowed to build a device that can see the interior of objects such as the retina with astonishing detail. In this talk we will unveil the fundamental physics behind OCT, will review the main features

that characterize an OCT system and will explore how OCT can be implemented in different physical scenarios.

Bio:

Juan P. Torres is an ICREA Professor and leader of the Quantum Engineering of Light group at ICFO. He specializes in quantum optics, designing entangled light with engineered spatial and spectral properties. His team uses nonlinear crystals to generate high-dimensional photon pairs for quantum computing and secure communications. They have developed quantum tomography, holography with undetected light, and teleportation protocols in over 10 dimensions. He is involved in strategic projects like QTWIST on 2D quantum materials and quantum key distribution over Catalonia's fiber networks. His research bridges quantum foundations with real-world technologies. He has published in top journals and is a leading figure in photonic quantum engineering.