



Guest Lecture by
Prof. Martin Leahy

SPIE BGU student chapter is inviting you to attend the lecture of
Prof. Martin Leahy from the **National University of Ireland**

The lecture will take place on
Tuesday 12/12/2017, at 12:00
Building 51, lecture hall 015
Refreshments will be served

Addressing Medical Imaging Challenges with Nanotechnology, OCT and Photoacoustics

Abstract:

Optical coherence tomography (OCT) allows 2 and 3D depth scans within the human body, similar to ultrasound but with much higher resolution and shallower depth. It is the fastest growing medical imaging modality with enormous clinical and economic impact; \$6,000,000,000 in equipment sales, \$10,000,000,000 in health care savings. It is at various stages of acceptance and approval for eye care, coronary care and skin cancer care and is spreading rapidly to other medical specialties. Indeed, it is the leading success of translation of biophotonics science into clinical practice. This lecture will provide a fundamental understanding of OCT and our efforts to make it nanosensitive and to make a miniature, low cost version for mass application in biometrics and home care.

Photoacoustic imaging (PAI) is an exciting new form of medical imaging that uses lasers to illuminate cells and tissues under the skin to detect structures (bones, muscles, etc., blood vessels, blood oxygen levels, and other signs of healing). Its value largely derives from its optimal use of light and sound. The Galway team invented a unique star-shaped gold nanoparticle that amplifies the signal from PAI, to greatly increase its useful depth. Stem cells tagged with this nanoparticle

can be tracked and studied, while their healing effects can be measured by PAI and morphology changes can be detected by nanosensitive imaging also developed by the Leahy group. These breakthroughs are the foundation of a new €6 million EU-funded Horizon2020 project, 'STARSTEM', led by Prof. Leahy. Photoacoustic tomography has grown to have the largest conference at Photonics West and is beginning to make an impact in the clinic in areas such as melanoma and lymph node detection in cancer. This lecture will provide a fundamental understanding of Photoacoustic Imaging and some applications.

Biography



Professor Martin J. Leahy

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Website

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http://www.nuigalway.ie/faculties_departments/physics/staff_pages/m_leahy/

Martin Leahy has a DPhil in Biophotonics from Oxford, is the professor of applied physics and a serial entrepreneur having been technical and/or managerial lead of five successful spin-out companies in biophotonics and energy. His main research interest is in the advancement of existing technologies such as laser Doppler and laser speckle as well as the development of new modalities such as TiVi and cmOCT for 2D, 3D and 4D imaging of the microcirculation. His group has invented cmOCT to image the microcirculation, nanosensitive OCT to sense nanostructure and multiple reference OCT to achieve a 100-fold reduction in size and cost. However, his group is probably best known for the invention of the heart rate app, which is now in use by more than 200 million people and is integrated into IOS and Android. More recently, his group have developed a label-free superresolution microscope and the brightest nanoparticle for deep in vivo imaging. He has secured more than €14M in external R&D funding since 2007, including industry, EU and SFI. Since 2010 he has delivered 35 international invited lectures and published 39 senior author journal articles and more than 600 patents cite his work. Professor Leahy retains a healthy involvement in industrial R&D, collaborating with start-ups such as Compact Imaging and multinationals like Covidien, Fujifilm and VisualSonics. TOMI NUI Galway will substantially expand its facilities following several major funding wins from EU Horizon 2020, SFI, IRC and industry totaling €7 million. These wins acknowledge progress in miniaturizing Optical Coherence Tomography (OCT), providing label-free nanosensitivity and superresolution deep within samples and the development of the brightest nanoparticle for in vivo deep tissue imaging. Several postdoc and PhD positions are available.

*Warmest Regards,
SPIE BGU Student Chapter*