

Paint Branch Distinguished Lecture in Applied Physics

The Paint Branch Distinguished Lecture in Applied Physics was established and endowed by a generous gift to IREAP in 2014 with the intention to bring luminaries in the field of Applied Physics to speak to our community. We hope that this lecture will bring together students, faculty, and community members to celebrate research that dissolves the boundaries of classic disciplines. This is the inaugural Lecture.

Remote Detection via Quantum Coherence

Professor Marlan O. Scully

Baylor, Princeton, and Texas A&M Universities

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4 p.m., Room 1101

Biosciences Research Building

Abstract: There is nothing so practical as a good theory. As a case in point, the compelling need for standoff detection of hazardous gases and vapor indicators of explosives has motivated the development of remotely pumped schemes that produce radiation in the backward direction [1,2]. Moving from conceptualization to theoretical analysis and experimental verification, we demonstrate that high gain can be achieved in air. Backward air lasing provides possibilities for remote detection [3], as will be discussed.

Bio: Marlan Scully (Baylor, Princeton, and Texas A&M) has worked on a variety of problems in laser physics and quantum optics, including: the first quantum theory of the laser with Lamb, the laser phase transition analogy and its applications to the Bose condensate, experimental demonstrations of lasing without inversion, and ultraslow light in hot gases via quantum coherence.

His introduction of entanglement interferometry to quantum optics has shed light on the foundations of quantum mechanics, e.g., the quantum eraser. Recently he and his colleagues have applied quantum coherence to remote sensing of anthrax and probing through turbid mediums, such as skin and plant tissue.

Scully is currently a Distinguished University Professor at Texas A&M University and also holds positions at Princeton and Baylor Universities. He has been elected to the U.S. National Academy of Sciences and the Max Planck Society. He has recently been awarded the OSA Frederic Ives Medal / Quinn Prize, the DPG/OSA Herbert Walther Award, and the Commemorative Silver Medal of the Senate of the Czech Republic (by K. Chapin).

[1] Dogariu, A, Michael, JB, Scully, MO, Miles, RB, High-Gain Backward Lasing in Air, *Science*, 331(6016), 442-445 (2011).

[2] Svidzinsky, AA, Yuan, LQ, Scully, MO, Transient lasing without inversion, *New Journal of Physics*, vol. 15, art. no. 053044 (2013).

[3] Yuan, L, et al., Coherent Raman Umklappscattering, *Laser Physics Letters*, 8(10), 736-741 (2011).