Quantum Optical Metrology with High-intensity NOON States

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Abstract: Quantum entanglement, introduced by Schrödinger in the context of CAT paradox and which Einstein found quite unconvincing, has now become a reality. In particular, photonic NOON states in which N photons in a superposition of all being in one of two designated modes exhibit enhanced phase sensitivity and allow reaching the fundamental quantum limit of precision measurement. However, generation of NOON states with high N is limited. Furthermore the rate of photon flux is very low for practical purposes. This talk would focus on some of the emerging ideas in super-resolving and super-sensitive phase measurements in quantum interferometry. We propose to use a special source of entangled photons leading to high intensity NOON states with large N. The scheme utilizes multiphoton interference between non-locally correlated and classical-coherent states of light.

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Host: Lan Yang, PhD

Bio: Aziz Kolkiran is an Assistant Professor of Physics at İzmir Katip Celebi University, Turkey. He received B.Sc. and M.Sc. degrees from Department of Physics, Middle East Technical University (METU), Ankara, Turkey, respectively in 1996 and 1999. He held research positions at METU Physics department and at the Institute of Physics, Stuttgart University, Germany until 2003. He received his Ph.D. in Photonics from Oklahoma State University in 2008. During 2008-2009, he was with the Department of Physics, Mesoscopic Physics & Quantum Information Group, at Chonnam National University, South Korea. Dr. Kolkiran is specialized on the use of entangled light in quantum imaging and sensing, quantum interferometry and optical super-resolution. Dr. Kolkiran's current research is in theoretical investigation of quantum properties of nanomechanical resonators and hybrid super-resolution techniques using evanescent and non-classical light.