RESEARCH INSTITUTE FOR FUNDAMENTAL SCIENCES

TÜBİTAK TBAE LECTURES

Celebrating 60 Years of TÜBİTAK

Özgür Müstecaplıoğlu

Koç University - TBAE, Türkiye

Quantum Mechanics: From Fundamentals to High Technologies

2023 Spring

Course Catalog: Review of linear algebra, complex numbers, probability theory, Fourier transformation, Hilbert space, postulates of quantum mechanics, polarization and photon concept, quantum measurements, quantum interferometry, basics of quantum cryptography, The BB84 protocol, quantum operators, quantum uncertainty, Schrödinger equation, quantum entanglement, EPR paradox, Bell inequality, GHZ nonlocality, basics of quantum computation, quantum communication and quantum teleportation, quantum repeater, quantization of harmonic oscillator, quantum tunneling, unitary operators, projection operators, quantum circuits, quantum programming.

The critical role of young researchers and motivated graduate students in the success of research institutes around the world is very well known. This fact takes an important part among the basic principles of the TÜBİTAK Research Institute for Fundamental Sciences (TBAE). One of the important goals of the Institute is to involve young researchers and students in scientific activities as well as to offer high-level lectures in various fields of fundamental sciences.

It is difficult to imagine high standards of scientific research without high-level of education. It is also hard to talk about high-level of education without high-level fundamental science background.

Bugün dünyada temel bilim alanlarında bilgi üretimi inanılmaz boyutlara ulaşırken, bu bilgilerin eğitim sürecine zamanında yansımasında doğal olarak sıkıntılar yaşanmaktadır. Bu durum bütün dünyada olduğu gibi bizim ülkemizde de gözlemlenmektedir; Üniversitelerimizin yüksek lisans ve doktora programlarında yeterince ileri düzey dersler açılmamaktadır. Bunun gibi sorunların giderilmesi yönündeki gelişmelere önemli katkılar sağlamak amacıyla, TBAE bünyesinde genç araştırmacılara, son sınıf lisans, yüksek lisans ve doktora öğrencilerine yönelik ileri düzey dönemlik dersler açılmaktadır.

Bio: Özgür Müstecaplıoğlu was born on March 20, 1971 in Istanbul, Türkiye. He obtained his B.S. in physics as well as his Ph.D. on quantum optics from Bilkent University. Özgür Müstecaplıoğlu received Turkish National Science and Technology Foundation Award for a visiting researcher program for outstanding Ph.D. students in 1999 and visited University of Toronto to do research on photonic band gap materials in Prof. Sajeev John's research group. He had worked in Atomic Molecular and Optical Physics group of Georgia Institute of Technology as a research scholar in 1999–2002. He joined Koç University in 2002, where he is currently working as a professor.

Özgür Müstecaplıoğlu received the 2004 Distinguished Young Scientist Award of Turkish Academy of Sciences (TÜBA-GEBİP) and the 2007 TÜBİTAK (Scientific and Technical Research Council of Türkiye) Encouragement Award. He is the vice-president of International Commission for Optics, Türkiye Chapter. His research involves theoretical studies in interdisciplinary areas covering quantum optics, optical properties of semiconductors, foundations of quantum electrodynamics, atomic Bose-Einstein condensates, quantum information science and technology and nonlinear optics.

Özgür Müstecaplıoğlu is a member of American Physical Society, European Physical Society, Optical Society of America and The International Society of Optical Engineering.

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