

NEW COURSE

OLD NUMBER -- PHY 565

SPRING 2019 - - MWF 12:00 - 12:53

The enormous excitement and revolutionizing progress in the fields of atomic, molecular, and optical physics (AMO) during the recent past have been recognized by eight Nobel prizes in the past 21 years. Thus over 1/3 of all the physics Nobel prizes in your lifetime have gone to AMO physics - what does the future hold ??

The physics underlying this phenomenal record of awards will be presented in this new course. It will start with “cold atom physics” (1997, 2001, and part of 2018) and then go on to the revolution in quantum mechanics that underlies the emerging upheaval of quantum information (2012), largely enabled by cold atoms. Then it will address the transformative technologies that provide for gravitation wave detection (part of 2005 and 2017), and the astounding innovations that have facilitated all this phenomenal progress (rest of 2005 and 2018, 2009, 2014). There will be discussion on topics for future prizes.

Many personal aspects of the lives and coincidences of the Laureates will be discussed as well. Much of the reading material will derive from their published Nobel lectures that are always beautifully written.

Background requirements are a good basis in E&M as well as quantum mechanics. A few advanced undergraduates may be admitted.

1997 - Laser Cooling: Chu, Cohen-Tannoudji, and Phillips,

2001 - Bose-Einstein Condensation: Cornell, Ketterle, and Weiman

2005 - Quantum Optics and Frequency Comb: Glauber, Hall, and Hänsch

2009 - Fiber Optics and CCD Sensors: Boyle, Kao, and Smith

2012 - Properties of Quantum Systems: Haroche and Wineland

2014 - Light Emitting Diodes: Akasaki, Amano, and Nakamura

2017 - LIGO: Barish, Thorne, and Weiss

2018 - Optical Tweezers, Chirped Pulse Amplifiers: Ashkin, Mourou, and Strickland