Πρόσκληση σε Δημόσια Παρουσίαση της Διδακτορικής Διατριβής του

κ. Ιωάννη Δρουγκάκη

(Σύμφωνα με το άρθρο 41 του Ν. 4485/2017)

Την **Πέμπτη 7 Οκτωβρίου 2021** και ώρα **15:00** στην **αίθουσα Τηλε-εκπαίδευσης Ε130,** στο κτήριο του **Τμήματος Μαθηματικών και Εφαρμοσμένων Μαθηματικών** του Πανεπιστημίου Κρήτης, θα γίνει η δημόσια παρουσίαση και υποστήριξη της Διδακτορικής Διατριβής του υποψήφιου διδάκτορα του Τμήματος Επιστήμης και Τεχνολογίας Υλικών κ. Ιωάννη Δρουγκάκη με θέμα:

« Precision engineering for ultra-cold atoms and space experiments »

Abstract

Ultra-cold atom technologies promise significant improvements in the fields of sensing, communication, quantum simulation, and computation. In order to fully exploit their capabilities, many new technologies need to be developed. In this thesis I focus on three of them: precision engineering of the guiding potentials, precision engineering of the input state for the atom sensor, and ultra-stable and robust optical technologies for atom quantum space missions. These three main challenges of the field are investigated in this thesis. First, I explore the limits of excitationless transport of Bose-Einstein condensates (BECs) and thermal ultra-cold atomic ensembles in magnetic time-averaged potential (TAAP) ring-shaped waveguides by artificially introducing obstacles in the waveguide. We find that over a broad plateau no excitation occurs up to a threshold value of roughness, where an abrupt increase in the excitation of the atomic cloud is observed. I also present a robust and simple detection method, with only 1% error in the measurement of the atom number. This constitutes an improvement of about 10 in the precision of our experimental sequence. The method has potential as a minimally destructive measurement technique for the quantum state and the temperature of the ultra-cold cloud. Finally, a space-compatible optical fiber link was developed for atom quantum space missions. High coupling efficiency of the order of 94% and RMS fluctuations of less than 1% in the presence of 30K temperature fluctuations and vibrations were achieved. These demonstrations pave the way towards the realization of practical devices based on ultra-cold atoms.