**Πρόσκληση σε Δημόσια Παρουσίαση της Διδακτορικής Διατριβής του**

**κ. Αντώνιου Παπαδόπουλου**

**Επιβλέπων Καθηγητής: Γεώργιος Κιοσέογλου**

(Σύμφωνα με το άρθρο 95, παρ. 3 του Ν. 4957/2022, ΦΕΚ 141 τ. Α΄/21.7.2022)

Την **Παρασκευή 28 Απριλίου 2023** και ώρα **10:00** στην **αίθουσα Β2 του Τμήματος Χημείας του Πανεπιστημίου Κρήτης**, θα γίνει η δημόσια παρουσίαση και υποστήριξη της Διδακτορικής Διατριβής του υποψήφιου διδάκτορος του Τμήματος Επιστήμης και Τεχνολογίας Υλικών κ. Αντώνιου Παπαδόπουλου, με θέμα:

# «Advanced Laser Processing and Spectroscopy of 2D Materials»

## Abstract

Two dimensional (2D) materials are a rapidly growing research field since 2004 since the breakthrough of the graphene monolayer isolation. Their unique optoelectronic properties compared to their 3D counterparts have been investigated in multidisciplinary fields throughout the scientific community. A particular class of 2D materials is transition medal dichalcogenide (TMD) monolayers which are a semiconductor alternative to graphene in applications where the existence of a band gap is required. The scope of this thesis is to prepare and study TMD monolayers at various conditions using advanced characterization methods. Experimental investigations of tungsten disulfide (WS2) monolayers were performed on various substrates such as hBN, Graphene, Graphite, Silicon dioxide and laser engineered surfaces for understanding the effect of WS2 optical properties with the interaction environment. Studies have shown that the properties of TMDs are affected by their surrounding environment. The temperature of the material is also another important parameter and thus it was accurately controlled for a range of 78K to 300K using a cryostat system. Characterization methods including photoluminescence, Raman, and spin valley spectroscopy as well as optical microscope and SEM imaging were employed for an in-depth analysis of the materials. A significant contribution of this thesis, among others, is the correlation between the spin valley spectroscopy and the carrier dynamics of TMD monolayers. Transient absorption spectroscopy (TAS)

measurements were performed to investigate the carrier dynamics in order to understand the ultrafast optical phenomena of the materials.