

بسمه تعالی

## اطلاعیه برگزاری سمینار علمی

عنوان:

Ultra-fast modulation of buried heterostructure mid-infrared Quantum Cascade Lasers

ارائه دهنده:

آقای دکتر علیرضا متقی زاده

### Abstract:

Quantum Cascade Lasers (QCLs) are unipolar optoelectronic devices based on intersubband transitions [1]. The large number of nanometer-thick semiconductor layers makes the QCL the most impressive demonstration of the capabilities offered by band structure engineering and state-of-the-art materials growth. These powerful semiconductor light sources cover a wide frequency range from THz region down to  $3\mu\text{m}$  wavelength in the mid-infrared. They are characterized by an ultrafast upper state carrier lifetime, in the order of picosecond (ps), enabling the high frequency modulation up to hundreds of GHz [2]. After introducing quantum cascade lasers and their various applications, I will present 26.5 GHz (circuit cut-off frequency) direct modulation of a mid-infrared buried heterostructure QCL emitting at  $9\mu\text{m}$  using an ultra-fast Quantum Well Infrared Photodetector (QWIP) of 65 GHz bandwidth as a detector. A significant increase of the modulation frequency bandwidth is observed by increasing the laser driving DC current. Finally, I will show that the laser cavity round-trip frequency,  $f_{rt}$ , can be injection-locked by direct modulation of laser driving current, hinting to mode-locked operation.

مکان ارائه: کلاس شماره ۳ - طبقه همکف پژوهشکده لیزر و پلاسما

زمان ارائه: یکشنبه ۹۶/۲/۲۴، ساعت ۱۵/۳۰