



University of Crete  
Department of Physics

## Physics Colloquium

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Thursday, 14 March 2024 | 17:00 – 18:00, Seminar Room, 3rd floor

# Adaptive membrane quantum well lasers for photonic applications

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### ABSTRACT

*Our work concentrates on the development of semiconductor lasers and integrated optics for applications in Quantum science and technology. We will present our research on coherent laser arrays operating in epitaxially grown semiconductor membrane quantum wells. The membranes are deposited by transfer on substrates of oxidised silicon and we record the real and reciprocal space of the laser emission. The Laser arrays operate in a lateral emission geometry and are waveguide lasers where the end mirrors are the end-facets of the cleaved membranes. Cavities in the order of 100 microns are usually formed and we measure Laser thresholds down to 50 mW. We are able to form waveguide laser arrays and we use real and reciprocal space imaging to examine the emission characteristics of the lasing cavities. We discover that the Laser arrays are mutually coherent and the lasers can operate on a single frequency or multiple longitudinal modes. We will present how the emission of the Lasers and their coherence can be controlled using a digital micromirror device to position and shape the pump illumination, we will show control of threshold, coherence, frequency and possible control of phase. We will also discuss potential applications in integrated photonic circuits.*