

SEMINARIO
Departamentos de Física Teórica I y II
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TITULO: Semiconductor nanostructures grown on GaAs nanoholes for quantum optical information technologies

LUGAR: FACULTAD DE CIENCIAS FÍSICAS UCM

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ABSTRACT

Single semiconductor quantum dots embedded in photonic and electronic devices are considered a fundamental resource for Quantum Information Science and Technology (QIST).

These quantum dots are fabricated using the same materials and methods of today's semiconductor technologies. Regarding their quantum properties, they are like artificial atoms which enable the control of single charges, single spins and single photons. Yet, the standard fabrication methods lead to the random nucleation of quantum dots over the semiconductor substrate, and this is a serious drawback for the deterministic and scalable fabrication of the building blocks of QIST. In this talk, I will discuss how semiconductor nanostructures grown directly over pre-patterned substrates could in principle solve this problem. To do so, I will present a few examples of single charge and single photon experiments performed in our group using quantum dots and quantum dot molecules grown on GaAs nanoholes. [1-2]

1. Martín-Sánchez, J. et al. Single Photon Emission from Site-Controlled InAs Quantum Dots Grown on GaAs(001) Patterned Substrates. ACS Nano 3, 1513–1517 (2009).
2. Muñoz-Matutano, G. et al. Charge control in laterally coupled double quantum dots. Phys. Rev. B Rapid Comm. 84, 041308 (2011).