Materials Science Institute, University of Valencia
Post-doctoral position
Acoustoelectric Single Photon Detector: Theoretical Modelling

Context:
A novel single-photon detector, capable of discriminating the number of photons in a light pulse, will be studied and developed in the framework of a recently started EU-funded research project. The operation of the detector will be based on a new type of optoelectronic nanocircuit on GaAs that will combine the dissociation and transport of photogenerated electrons and holes induced by surface acoustic waves (SAW's), with ultrafast single-electron electronics techniques. The device will have immediate important applications in quantum information processing (quantum computing, secure communications, and quantum optics) and in areas where detection of ultra weak photon fluxes is required.

Job description:
The post-doc position is offered within the EU-funded STREP-FET project “ACDET II”. You will actively participate in the development of the acoustoelectric single-photon detector by helping in the theoretical modelling of the device. The theoretical goals of the project can be grouped into three separated tasks:

(i) Development of numerical modeling tools to characterise the generation and propagation of the SAW's in the multilayer structures underlying the device.
(ii) Theoretical and computational study of all the aspects related to the SAW-induced transport of charge, by means of classical transport theory.
(iii) Quantitative theoretical model of the operation of the single-electron transistor under a surface acoustic wave will be developed, by properly treating the quantum nature of the detection process, incorporating effects such as tunneling and Coulomb blockade. This study will be performed by using a phase space formulation in terms of the Wigner function.

You will be involved in one or various of these tasks according to your background and capacities.

Profile:
A PhD in physics or electrical engineering is required. Experience in the computational simulation of semiconductor optical and/or transport properties is highly desirable. The candidate should have team spirit with good communication and reporting skills.

The position is available for one year (beginning during the second-half of 2006), with a 12 months extension option.

If you are interested, send a CV + motivation letter + list of references (preferably by e-mail) to:

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