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PHOTOIONIZATION AND POLARIZATION OF
ELECTRONS IN BULK AND LOW-DIMENSIONAL
SEMICONDUCTORS

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ABSTRACT

The dependence of photoionization cross-section on photon energy is calculated for bulk impurities using different impurity potentials. The effect of anisotropy is taken into account and is shown to affect the spectral dependence drastically.

The polarizabilities of shallow donors in finite-barrier $GaAs/Ga_{1-x}Al_xAs$ quantum wells are calculated using the Hasse variational method within the effective-mass approximation. The magnetic field dependence of polarizabilities is also studied.

The polarization of a subband electron confined in a one-dimensional potential well in the presence of a uniform electric field is calculated numerically. It is shown that the anomalous negative polarization reported in the literature results for the case of an infinite and a finite-barrier Quantum Well with electric field confined to the well region. We find positive polarization for all values of the applied field for this second case.

Keywords : low-dimensional semiconductors, shallow impurity, photoionization, polarizability

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