

ENERGY SPECTRA AND LIFETIMES
OF QUASIPARTICLES IN AN OPEN
CYLINDRICAL QUANTUM WIRE

V.A. Holovatsky, V.I. Gutsul

Chernivsti National University
(2, Kotsyubynskiyi Str., Chernivtsi 58012, Ukraine;
e-mail: theorphys@chnu.cv.ua)

S u m m a r y

The energies and lifetimes of the quasistationary states of quasiparticles in an open cylindrical quantum wire have been calculated numerically in the effective mass approximation making use of the scattering matrix method. The calculations have been performed for a GaAs/Al_xGa_{1-x}As/GaAs nanoheterosystem. The dependences of the quasiparticle lifetimes in quasistationary resonance states on the geometrical sizes of nanosystems and the quasiparticle's longitudinal quasimomentum have been obtained. The lifetime of quasiparticles in the system concerned has been shown to decrease exponentially with increase in their longitudinal quasimomenta. For energies above the potential barrier, a repulsion of energy levels, which manifests itself through a nonmonotonic lifetime behavior, is observed.