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Language skills

English Русский Deutsch

Publications

Article

Exciton-optical phonon coupling in non-spherical quantum dots: A resonant Raman study of InP/ZnSe nanocrystals

A.L. Vartanian, A.L. Asatryan, A.H. Movsisyan, L.A. Vardanyan, N. Del Fatti, F. Valle'e

Computational Materials Science 2025 113394/11

Article

Kohn Anomaly with Spin-Orbit Coupling in Monolayer Graphene: A Method to Determine the Rashba Parameter

Arshak L. Vartanian

ACS Applied Electronic Materials 2025 6348 - 6355

Article

Coherent Control of a Shallow Impurity Quantum States in Graphene Monolayer by Bichromatic Phase Modulated Laser Pulses: Influence of Relaxation Processes [Когерентное управление квантовыми состояниями мелкой примеси в монослое графена с помощью фазомодули]

A.A. Avetisyan, A.P. Djotyan, G.P. Djotyan, A.L.Vartanian, A.L. Asatryan

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2025 42-49

Article

Comparative study on polaronic quantum confinement effects in wurtzite ZnO and GaN nanowires under external fields

Anna Asatryan, Arshak Vartanian, Serob Hayrapetyan, Tigran Ghukasyan, Artak Avetisyan, Ya-Hong Xie

Results in Physics 2025 108535

Article

In situ microstructural and electrical characterizations of liquid metal stretchable conductors

Souren Grigorian, Dmitriy Ksenzov, Tigran Ghukasyan, Arshak L. Vartanian

Materials Today Communications 2025 114317

Article

Intermediate interaction theory of the Dirac fermions with plasmon-surface LO-phonon excitations in the monolayer graphene on polar substrate

Arshak L.Vartanian

Article

Simultaneous effects of the confinement of polar optical phonons and spin-orbit coupling on the free carrier absorption of a nanowire

A.L. Vartanian, T.K. Ghukasyan, A.L. Asatryan, K.A. Vardanyan, A.A. Kirakosyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2022 207287

Article

Polaronic effects on the electron Raman scattering in a spherical anisotropic quantum dot

T.K. Ghukasyan, A.L. Asatryan, L.A. Vardanyan, A.A. Kirakosyan, A.L. Vartanian

Armenian Journal of Physics 2022 175-181

Article

External electric and magnetic field effects on the polaron in a wurtzite nitride nanowire embedded in a nonpolar matrix

Anna L. Asatryan, Ashot H. Movsisyan, Arshak L. Vartanian

EUROPEAN PHYSICAL JOURNAL B 2021 id 70/8

Manual

Պինդ մարմնի ֆիզիկայի լաբորատոր աշխատանքներ. մաս 2

Արթուր Կիրակոսյան, Արշակ Վարդանյան, Աննա Ասատրյան, Արամ Մանասեյան,

Վալերի Հարությունյան

2021 190

Article

Polaronic effects on the impurity-related linear and nonlinear optical properties in a nanowire with magnetic field

Arshak L. Vartanian, Tigran K. Ghukasyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2020 106339(1-13)

Article

Possible Frohlich surface polaron formation in graphene on a polar substrate

Arshak L. Vartanian

Physica E: Low-dimensional Systems and Nanostructures 2020 113847(1-5)

Article

Effect of spin-orbit coupling on the hot-electron energy relaxation in nanowires

A. L. Vartanian, A. L. Asatryan, A. G. Stepanyan, K. A. Vardanyan, A. A. Kirakosyan

International Journal of Modern Physics B 2020 2050322(1-13)

Article

Influence of image charge effect on the binding energy of hydrogen-like donor impurity in a near-surface quantum well under transverse electric field

A.L. Vartanian, A.L. Asatryan, A.A. Kirakosyan, K.A. Vardanyan

Physica E: Low-dimensional Systems and Nanostructures 2019 1-4

Article

Influence of image charges on the impurity-related optical properties of near-surface quantum wells under a transverse electric field

A.L. Vartanian, A.L. Asatryan, L.A. Vardanyan

Physica E: Low-dimensional Systems and Nanostructures 2019 115-120

Article

Polaron and dielectric mismatch effects on impurity-related optical absorption and refractive index changes in a spherical quantum dot

A.L. Vartanian, A.L. Asatryan, L.A. Vardanyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2018 442-458

<https://www.journals.elsevier.com/superlattices-and-microstructures>

Article

Impurity-Bound Polaronic States in ZnSe Quantum Dots Under Electric Field: Image Charge Effect

A. Vartanian, A. Asatryan, L. Vardanyan

JOURNAL OF ELECTRONIC MATERIALS 2018 4303-4307

Article

Effect of Rashba spin-orbit coupling on polaron properties in CdSe nanowire under electric field

A.L.Vartanian, L.A.Vardanyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2018 224-228

Article

Spin relaxation mediated by spin-orbit and acoustic phonon interactions in a single-electron two-dimensional quantum dot

A.L. Vartanian, A.A. Kirakosyan, K.A. Vardanyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2018 548-556

Article

Energy loss rate of hot electrons due to polar-optical phonon modes in a semiconductor nanowire under transverse electric field

A. Stepanyan, A. Asatryan, M. Yerosyan, K. Vardanyan, A. Kirakosyan, A. Vartanian

Physica B: Condensed Matter 2018 340-346

Article

Influence of image charge effect on impurity-related optical absorption coefficients and refractive index changes in a spherical quantum dot.

A.L. Vartanian, A.L. Asatryan, L.A. Vardanyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2017 205-212

<http://www.journals.elsevier.com/superlattices-and-microstructures>

Article

Energy-loss rate of hot electrons due to confined acoustic phonon modes in a semiconductor quantum wire under transverse electric field.

A. Stepanyan, M. Yerosyan, L. Vardanyan, A. Asatryan, A. Kirakosyan, A. Vartanian

Physica B: Condensed Matter 2017 102-107

<http://www.journals.elsevier.com/physica-b-condensed-matter>

Article

Frohlich polaron in nanowire with Rashba and Dresselhaus spin-orbit couplings

Arshak Vartanian, Albert Kirakosyan, Karen Vardanyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2017 655-661

<http://www.journals.elsevier.com/superlattices-and-microstructures>

Article

EFFECTS OF ELECTRIC FIELD AND IMAGE CHARGES ON THE IMPURITY-RELATED OPTICAL ABSORPTION COEFFICIENTS IN A SPHERICAL QUANTUM DOT

A.L. Vartanian, A.L. Asatryan, A.A. Kirakosyan, A.A. Mkhitaryan, S.S. Avetisyan

Proceedings of the YSU A. Physical and Mathematical Sciences 2017 124-127

<http://www.y-su.am/science/en/journals>

Article

ONE-DIMENSIONAL FRÖHLICH POLARON WITH SPIN-ORBIT COUPLING

K. Vardanyan, A. Kirakosyan, A. Vartanian

Вестник Российско-Армянского Университета: Физико-математические и естественные науки 2017 41-46

<http://science.rau.am/rus/50/701>

Article

Influence of spin-orbit interactions on the polaron properties in wurtzite semiconductor quantum well

Mkrtich A. Yerosyan, Arshak L. Vartanian, Karen A. Vardanyan

Physica E: Low-dimensional Systems and Nanostructures 2016 330-335

<http://www.journals.elsevier.com/physica-e-low-dimensional-systems-and-nanostru...>

Article

Influence of the image charge effect on the hydrogen-like impurity-bound polaron in a spherical quantum dot in the presence of an electric field

Arshak L. Vartanian, Lyudvig A. Vardanyan

Physica E: Low-dimensional Systems and Nanostructures 2016 174-180

<http://www.journals.elsevier.com/physica-e-low-dimensional-systems-and-nanostru...>

Article

Image Charge and Electric Field Effects on Hydrogen-like Impurity-bound Polaron Energies and Oscillator Strengths in a Quantum Dot

L.A. Vardanyan, A.L. Vartanian, A.L. Asatryan, A.A. Kirakosyan

JOURNAL OF ELECTRONIC MATERIALS 2016 5847-5852

<http://www.springer.com/materials/optical+%26+electronic+materials/journal/11664>

Article

Electric field and image charge effects on impurity-bound polarons in a CdS colloidal quantum dot embedded in organic matrices

A.L. Asatryan, A.L. Vartanian, A.A. Kirakosyan, L.A. Vardanyan

Physica B: Condensed Matter 2016 70-74

<http://www.journals.elsevier.com/physica-b-condensed-matter>

Manual

Պինդ մարմնի ֆիզիկայի լաբորատոր աշխատանքներ մաս I

Արթուր Կիրակոսյան, Արշակ Վարդանյան, Աննա Ասատրյան, Արամ Մանասեյան,

Գառնիկ Վերմիշյան

Article

The influence of electric field on the interface polaron properties in a wurtzite nitride nanowire.

Anna L. Asatryan, Karen A. Vardanyan, Arshak L. Vartanian

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2015 286-294

<http://www.journals.elsevier.com/superlattices-and-microstructures>

Article

Polaronic effects due to quasi-confined optical phonons in wurtzite nitride nanowire in the presence of an electric field.

Karen A. Vardanyan, Anna L. Asatryan, Arshak L. Vartanian

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2015 588-594

<http://www.journals.elsevier.com/superlattices-and-microstructures>

Article

The influence of electric field on the quasi-confined and interface polaron basic parameters in a wurtzite nitride quantum wire.

A.L. Asatryan, K.A. Vardanyan, A.L. Vartanian, A.A. Kirakosyan

Journal of Physics: Conference Series 2015 012048/1-4

<http://iopscience.iop.org/journal/1742-6596>

Article

Confined acoustic phonon-mediated spin relaxation in a twodimensional quantum dot in the presence of perpendicular magnetic field

K A Vardanyan, A L Vartanian, A G Stepanyan, A A Kirakosyan

Journal of Physics: Conference Series 2015 012043 /4pp

<http://iopscience.iop.org/journal/1742-6596>

Article

Electron capture processes in quantum dots due to one-and two-phonon assisted transitions: The role of optical phonon confinement

A L Vartanian, K A Vardanyan, V N Mughnetsyan, A A Kirakosyan

Journal of Physics: Conference Series 2015 012017/4pp

<http://iopscience.iop.org/journal/1742-6596>

Article

Effect of Phonon Confinement on Optical Phonon-Mediated Carrier Capture into CdSe/ZnS Quantum Dots

K.A. Vardanyan, A.L. Vartanian, A.A. Kirakosyan

JOURNAL OF ELECTRONIC MATERIALS 2015 2779-2785

<http://www.springer.com/materials/optical+%26+electronic+materials/journal/11664>

Article

Effect of phonon confinement on one- and two-polar optical phonon capture processes in quantum dots

K.A. Vardanyan, A.L. Vartanian, V.N. Mughnetsyan, A.A.Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2015 268-274

<http://www.journals.elsevier.com/physica-e-low-dimensional-systems-and-nanostru...>

Article

Phonon confinement effect on the polaron states in a double quantum ring structure in the presence of electric and magnetic fields

Mkrtich A. Yerosyan, Arshak L. Vartanian, Abbas Shahbandari, Albert A. Kirakosyan

Physica B: Condensed Matter 2015 365-370

<http://www.journals.elsevier.com/physica-b-condensed-matter>

Manual

Պիևդ մարմնի ֆիզիկայի խնդիրներ, Մաս I

Ա.Ա. Կիրակոսյան, Ա.Լ. Վարդանյան, Ա.Լ. Ասատրյան

2015 154

Conference

Effect of image charges on the impurity-bound polaronic states in colloidal quantum dots embedded in different organic matrices.

A.L. Vartanian, A.L. Asatryan, L.A. Vardanyan, A.A. Kirakosyan

Conference

Spin-orbit interaction enhanced polaron effect in wurtzite semiconductor quantum well.

M.A. Yerosyan, K.A. Vardanyan, A.L. Vartanian, A.A. Kirakosyan

Conference

Spin Relaxation in the Presence of Spin-Orbit Interactions in Single Electron Quantum Dots Embedded in a Suspended Phonon Cavity

A.L. Vartanian, K.A. Vardanyan, A.A. Kirakosyan

Conference

The influence of electric field on the quasi-confined and interface polaron basic parameters in a wurtzite nitride quantum wire.

A.L. Asatryan, K.A. Vardanyan, A.L. Vartanian, A.A. Kirakosyan

Conference

Effect of Rashba and Dresselhaus spin-orbit interactions on the polaron properties in wurtzite semiconductor quantum dot in the presence of external fields.

M.A. Yerosyan, K.A. Vardanyan, A.L. Vartanian, A.A. Kirakosyan

Conference

Confined acoustic phonon-mediated spin relaxation in a two-dimensional quantum dot in the presence of perpendicular magnetic field.

K.A. Vardanyan, A.L. Vartanian, A.A. Kirakosyan

Conference

Electron capture processes in quantum dots due to one- and two-phonon assisted transitions: The role of optical phonon confinement.

A.L. Vartanian, K.A. Vardanyan, V.N. Mughnetsyan, A.A. Kirakosyan

Conference

Dilatational and flexural acoustic-phonon mediated spin relaxation in a two-dimensional quantum dot in the presence of perpendicular magnetic field.

Arshak Vartanian, Karen Vardanyan, Armen Stepanyan, Albert Kirakosyan

Conference

Impurity-bound polaronic states under an external electric field in quantum dots: Image charge effect.

Lyudvig Vardanyan, Arshak Vartanian, Anna Asatryan

Conference

Electric field effect on hot-electron energy-loss rate via LA-phonon scattering in a cylindrical quantum wire.

A. Stepanyan, L. Vardanyan, A. Asatryan, A. Vartanian, A. Kirakosyan

Conference

Rashba and Dresselhaus spin-orbit coupling effects on the electronic structure of quantum wires under the influence of in-plane magnetic field.

V. Arzumanyan, K. Vardanyan, A. Asatryan, A. Vartanian

Conference

Influence of image charge effect on impurity-related optical absorption coefficient in a spherical quantum dot.

A. Mkhitarian, L. Vardanyan, A. Asatryan, A. Vartanian

Conference

Confined and interface polar optical phonon-limited electron mobility in quantum wires in the presence of perpendicular electric field.

K. Vardanyan, Y. Brsoyan, A. Vartanian, A. Kirakosyan

Conference

Influence of Phonon Confinement on Optical Phonon-Mediated Carrier Capture into CdSe/ZnS/H₂O Quantum Dots

Vartanian A, Vardanyan K, Kirakosyan A

Conference

Image charge effect on oscillator strength and intradonor absorption spectra under external electric field in quantum dots.

Arshak Vartanian, Anna Asatryan, Lyudvig Vardanyan

Conference

Quasi-one-dimensional Fröhlich polaron with spin-orbit Rashba and Dresselhaus couplings

Karen Vardanyan, Arshak Vartanian, Albert Kirakosyan

Conference

Impurity-Bound Polaronic States in ZnSe Quantum Dots under Electric Field: Image Charge Effect

A. Asatryan, L. Vardanyan, A. Vartanian

Conference

Effect of Rashba Spin-Orbit Coupling on Polaron Properties in CdSe Nanowire under Electric Field

A. Vartanian, K. Vardanyan

Conference

Dielectric mismatch and polaron effects on optical-absorption spectra and refractive index changes associated with impurities in quantum dots

Arshak Vartanian, Tigran Ghukasyan, Levon Samsonyan

Conference

The influence of the transverse electric field on the hot electron energy loss rate via polar-optical phonons in nanowires

A.Asatryan, A.Stepanyan, M.Yeranosyan, A.Kirakosyan, A.Vartanian

Conference

Magnetic field control of phononmediated decoherence of spin-based qubit in two-dimensional quantum dot embedded in a suspended slab

Arshak L. Vartanian

Conference

Wurtzite-nitride quantum wires under electric and magnetic fields: Polaron basic parameters

A.L. Asatryan, L.A. Vardanyan, A.A. Kirakosyan, A.L. Vartanian

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Պինդ մարմնի ֆիզիկայի լաբորատոր աշխատանքներ

Ալբերտ Կիրակոսյան, Արշակ Վարդանյան, Աննա Ասատրյան, Արամ Մանասեյան,

Գառնիկ Վերմիշյան

Conference

Exciton-Phonon Interaction in Elliptically Shaped Core-Shell Quantum Dots: Resonant Raman Scattering

Asatryan A.L., Vardanyan L.A., Vartanian A.L.

Conference

Phonon-Assisted Optical Absorption for Nanowires with Spin-Orbit Coupling

Ghukasyan T. K., Asatryan A.L., Vardanyan K.A., Kirakosyan A.A., Vartanian A.L.

Conference

First-order Raman spectra induced by the Fröhlich excitation-lattice interaction in a non-spherical core/shell nanocrystals

Anna Asatryan, Ashot Movsisyan, Siranush Avetisyan, Tatevik Hayriyan, Arshak Vartanian

Conference

Exciton Resonant Raman Scattering in Colloidal Quantum Dots: The Role of the Frohlich-Type Interaction

A. Asatryan, A. Movsisyan, L. Vardanyan, A. Vartanian

Conference

Intermediate Coupling Theory of the Dirac Fermions with Plasmon-Surface Polar Optical Phonon Excitations in the Monolayer Graphene on Polar Substrate

Arshak Vartanian
