

**Institute of Physics**  
Chair of Solid State Physics  
Professor

## 🌐 Language skills

Հայերեն

## 📖 Publications

*Article*

### **Effect of two-dimensional non-local screening on characteristics of transition metal dichalcogenide monolayers**

Vram Mughnetsyan, Aram Manaselyan, Ashot Movsisyan, Albert Kirakosyan

Semiconductor Science and Technology 2024 045016

*Article*

### **Planar quantum dots: Theoretical approaches**

Aram Manaselyan, Vram Mughnetsyan, Albert Kirakosyan

Encyclopedia of Condensed Matter Physics (Second Edition) 2024 297-307

*Article*

### **Quasi-One-Dimensional Fröhlich Polaron Characteristics in ZnO Nanowires under the External Fields [Характеристики квазиодномерного фрёлиховского полярона в нанопроволоках ZnO во внешних полях]**

A. Asatryan, A. Movsisyan, L. Vardanyan, S. Hayrapetyan, A. Kirakosyan

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2024 287 - 293

*Article*

### **Hofstadter-like spectrum and magnetization of artificial graphene constructed with cylindrical and elliptical quantum dots**

Maryam Mansoury, Vram Mughnetsyan, Aram Manaselyan, Albert Kirakosyan, Vidar Gudmundsson,

Vigen Aziz-Aghchegala

Physics Letters A 2023 129115

*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*

### **Signature of miniband nodes in magneto-optical properties of one-dimensional superlattice of planar quantum rings**

Maryam Mansoury, Vigen Aziz-Aghchegala, Vram Mughnetsyan, Albert Kirakosyan, Vidar Gudmundsson  
Physics Letters A 2022 128324

---

*Article*

**Electron-hole interaction in cylindrical quantum dots**

Vram Mughnetsyan, Ashot Movsisyan, Albert Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2022 115366

---

*Article*

**Electronic and Magnetic Properties of Laser Dressed Quantum Dot and Ring with Rashba Spin-Orbit Coupling**

Vram Mughnetsyan, Aram Manaselyan, Manuk Barseghyan, Albert Kirakosyan, Laura M. Perez,

David Laroze

Springer Proceedings in Physics (Optics and Its Applications) 2022 145-154

---

*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

---

*Manual*

**Պինդ մարմնի ֆիզիկայի լաբորատոր աշխատանքներ. մաս 2**

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

Վալերի Հարությունյան

2021 190

---

*Article*

**Interminiband absorption in a quantum ring superlattice in magnetic field with periodic vector potential**

Vram Mughnetsyan, Ara Atayan, Albert Kirakosyan, Vigen Aziz-Aghchegala

Physica E: Low-dimensional Systems and Nanostructures 2020 113722(1-6)

---

*Article*

**Effective tuning of isotropic and anisotropic properties of quantum dots and rings by external fields**

Manuk G. Barseghyan, Aram Manaselyan, Albert A. Kirakosyan, Laura M. Perez, David Laroze

Physica E: Low-dimensional Systems and Nanostructures 2020 113807(1-7)

---

*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

**Effect of anisotropic strain on the electronic characteristics of an InAs/GaAs honeycomb superlattice**

Vram Mughnetsyan, Albert Kirakosyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2019 243-251

---

Article

**Effect of the impurity on the Aharonov-Bohm oscillations and the intraband absorption in GaAs/ Ga<sub>1-x</sub>Al<sub>x</sub>As quantum ring under intense THz laser field**

M.G. Barseghyan, V.N. Mughnetsyan, L.M. Perez, A.A. Kirakosyan, D. Laroze

Physica E: Low-dimensional Systems and Nanostructures 2019 91-97

---

Article

**Rashba splitting of Dirac points and symmetry breaking in strained artificial graphene**

Vram Mughnetsyan, Aram Manaselyan, Manuk Barseghyan, Albert Kirakosyan, David Laroze

Physical Review B 2019 195132(1-8)

---

Manual

**Ատոմի ֆիզիկա**

Արթուր Կիրակոսյան

2019 224

---

Article

**Modeling of anisotropic properties of double quantum rings by the terahertz laser field**

Henrikh M. Baghramyan, Manuk G. Barseghyan, Albert A. Kirakosyan, Judith H. Ojeda, Jean Bragard,

David Laroze

Scientific Reports 2018 6145(1-10)

---

Article

**Intense Terahertz Radiation Effect on Electronic and Intraband Optical Properties of Semiconductor Quantum Rings**

H.M. Baghramyan, M.G. Barseghyan, A.A. Kirakosyan, D. Laroze

Physics of Quantum Rings 2018 411-445

---

Article

**Effect of interdiffusion and external magnetic field on electronic states and light absorption in Gaussian-shaped double quantum ring**

V.L. Aziz Aghchegala, V.N. Mughnetsyan, A.A. Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2018 11-16

---

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

*Article*

**Laser driven intraband optical transitions in two-dimensional quantum dots and quantum rings**

M.G. Barseghyan, A.A. Kirakosyan, D. Laroze

Optics Communications 2017 571-576

<http://www.journals.elsevier.com/optics-communications>

---

*Article*

**Effect of interdiffusion and magnetic field on two-electron states in Gaussian-shaped double quantum rings**

V.L. Aziz Aghchegala, V.N. Mughnetsyan, A.A. Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2017 157-163

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

---

*Article*

**Effect of Rashba spin-orbit coupling and external magnetic field on electronic minibands in highly strained one-layer quantum ring superlattice**

Vram Mughnetsyan, Aram Manaselyan, Albert Kirakosyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2017 10-18

<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. Yeranosyan, 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. Mkhitarian, 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

**Strain distribution and band structure of InAs/GaAs quantum ring superlattice**

Vram Mughnetsyan, Albert Kirakosyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2017 318-327

---

Article

**Elastic strain distribution in one layer quantum ring superlattice**

V.N. Mughnetsyan, A.A. Kirakosyan

Proceedings of the YSU A. Physical and Mathematical Sciences 2017 121-123

---

Article

**Influence of lateralel ectric field on intraband optical absorption in concentric double quantum rings**

H.M. Baghranyan, M.G.Barseghyan, D.Laroze, A.A.Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2016 81-89

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

---

Article

**Impurity-modulated Aharonov-Bohm oscillations and intraband optical absorption in quantum dot-ring nanostructures**

M.G. Barseghyan, A.Kh.Manaselyan, D.Laroze, A.A.Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2016 31-36

<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>

---

Article

**Laser driven impurity states in two-dimensional quantum dots and quantum rings**

D. Laroze, M.G. Barseghyan, A. Radu, A.A. Kirakosyan

Physica B: Condensed Matter 2016 1-4

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

---

Manual

**Պինդ մարմնի ֆիզիկայի լաբորատոր աշխատանքներ մաս I**

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

Գառնիկ Վերմիլյան

2016 168

---

Article

**Impurity-related intraband absorption in coupled quantum dot-ring structure under lateral electric field**

M.G. Barseghyan, H.M.Baghrmryan, D.Laroze, J.Bragard, A.A.Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2015 421-425

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

---

Article

**Rashba Spin-Orbit Coupling in a Two-Dimensional Quantum Ring Superlattice**

V. Mughnetsyan, A. Manaselyan, A. Kirakosyan

Micro and Nanostructures (Previously known as Superlattices and Microstructures) 2015 584-591

<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. Yeranosyan, Arshak L. Vartanian, Abbas Shahbandari, Albert A. Kirakosyan

Physica B: Condensed Matter 2015 365-370

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

---

*Article*

**Effect of interdiffusion on electronic states of strain-free Gaussian-shaped double quantum ring superlattice**

V.L. Aziz Aghchegala, V.N. Mughnetsyan, A.A. Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2015 30-35

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

---

*Article*

**Effect of interdiffusion on nonlinear intraband light absorption in Gaussian-shaped double quantum rings**

V.L. Aziz Aghchegala, V.N. Mughnetsyan, A.A. Kirakosyan

Physica E: Low-dimensional Systems and Nanostructures 2015 210-216

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

---

*Article*

**Effect of interdiffusion on band structure in GaAs/Ga<sub>1-x</sub>Al<sub>x</sub>As quantum ring superlattices**

V. Mughnetsyan, A. Kirakosyan, A. Manaselyan

6-th International Conference on Nanomaterials, NANOCON-2014, Conference Proceedings 2015 47-53

[http://nanocon2014.tanger.cz/files/proceedings/20/index\\_en.htm](http://nanocon2014.tanger.cz/files/proceedings/20/index_en.htm)

---

*Monograph*

**Պինդ մարմնի ֆիզիկայի ներածություն, Մաս I**

Ա.Ա. Կիրակոսյան

2015 288

---

*Monograph*

**Պինդ մարմնի ֆիզիկայի ներածություն, Մաս II**

Ա.Ա. Կիրակոսյան

2015 364

---

*Manual*

**Պինդ մարմնի ֆիզիկայի խնդիրներ, Մաս I**

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

2015 154

---

*Article*

**Потенциал точечного заряда в полупроводниковой гетероструктуре с цилиндрической симметрией**

А.А. Киракосян, Н.Г. Мовсисян, Ш.Г. Гаспарян

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2013

125-135

---

*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. Yerasosyan, 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

**Elastic Strain Distribution in one layer InAs/GaAs Quantum Ring Superlattice.**

V.N. Mughnetsyan, 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. Yerasosyan, 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

**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

**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/H<sub>2</sub>O Quantum Dots**

Vartanian A, Vardanyan K, Kirakosyan A

---

*Conference*

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

Karen Vardanyan, Arshak Vartanian, Albert Kirakosyan

---

*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*

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

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

---

*Ematerial*

### **Պինդ մարմնի ֆիզիկայի լաբորատոր աշխատանքներ**

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

Գառնիկ Վերմիշյան

---

*Ematerial*

### **Ատոմի ֆիզիկա**

Ա. Կիրակոսյան

---

*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*

### **Magneto-Optical Properties of Artificial Graphene Constructed of Cylindrical and Elliptical Quantum Dots**

YEGANYAN Lilit, MUGHNETSYAN Vram, MANSOURY Maryam, KIRAKOSYAN Albert, GUDMUNDSSON Vidar

---