

# Khachik Vazgen Sedrakyan

✉ khsedrak@ysu.am

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## Research Institute of Physics

Senior researcher

### Education

Institution	YSU
Faculty	physics
Date	1980 - 1985
Degree name	Qualified specialist

### Scientific Rank/degree

Institution	YSU
Date	2011
Degree name	Doctor
Specialty	Physico-mathematical sciences
Research Topic	Study of electron-positron vacuum and some induced processes in strong laser fields

### Language skills

Հայերեն Русский English

### Work experience

Institution	YSU
Period of time	1988 till now
Rank/degree	Senior researcher

### Scientific interests

- nonlinear electrodynamics, particle acceleration, pair generation, physics of graphene-like nanosystems

### Publications

*Article*

**Elliptically Polarized High Laser Harmonics in the Hexagonal Graphene Quantum Dot**  
**[Эллиптически поляризованные высокие лазерные гармоники в гексагональной графеновой квантовой точке]**

A. G. Ghazaryan, N. O. Arustamyan, G. H. Chopuryan, Kh. V. Sedrakyan

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2025  
160-165

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*Article*

**Optical anisotropy of high-order harmonic generation by strong laser radiation in rectangular graphene quantum dot**

Armenuhi G. Ghazaryan, Suren V. Sukiasyan, Khachik V. Sedrakian

Journal of Nanophotonics 2024 046002

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*Article*

**Multiphoton excitation and high harmonic generation in rectangular graphene quantum dot**

A. G. Ghazaryan, Kh. V. Sedrakian, G. A. Musayelyan, T. M. Markosyan

Physica Scripta 2023 055921/13

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*Article*

**Graphene valley polarization as a function of carrier-envelope phase in few-cycle laser pulses and its footprints in harmonic signals**

H. K. Avetissian, V. A. Sedrakyan, Kh. V. Sedrakian, G. F. Mkrtchian

Physical Review B 2023 205403

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*Article*

**ГЕНЕРАЦИЯ ВЫСШИХ ГАРМОНИК С УЧЕТОМ МНОГОЧАСТИЧНОГО КУЛОНОВСКОГО  
ВЗАИМОДЕЙСТВИЯ В ГРАФЕНОВОЙ КВАНТОВОЙ ТОЧКЕ**

Х. В. Седракян, А. Г. Казарян, Б. Р. Авчян, Г. А. Мусаелян, Т. М. Маркосян

Журнал экспериментальной и теоретической физики (Journal of Experimental and Theoretical  
Physics)  
2023 56-65

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*Article*

**High Harmonic Generation with Many-Particle Coulomb Interaction in Graphene Quantum Dot**

Kh. V. Sedrakian, A. G. Ghazaryan, B. R. Avchyan, G. A. Musayelyan, T. M. Markosyan

Журнал экспериментальной и теоретической физики (Journal of Experimental and Theoretical  
Physics)  
2023 47-54

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*Article*

**ГАРМОНИКИ ВЫСШЕГО ПОРЯДКА В ГЕКСАГОНАЛЬНЫХ ГРАФЕНОВЫХ КВАНТОВЫХ ТОЧКАХ**

Х.В. Седракян, А. Г. Казарян, Б. Р. Авчян, К.С. Погосян, Т.М. Маркосян

Журнал экспериментальной и теоретической физики (Journal of Experimental and Theoretical  
Physics)  
2023 457-466

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*Article*

**Higher-Order Harmonics in Hexagonal Graphene Quantum Dots**

Kh. V. Sedrakian, A. G. Ghazaryan, B. R. Avchyan, Q. S. Poghosyan, T. M. Markosyan

Journal of Experimental and Theoretical Physics 2023 395-403

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*Article*

**Long-range correlation-induced effects at high-order harmonic generation on graphene**

## **quantum dots**

H. K. Avetissian, A. G. Ghazaryan, Kh. V. Sedrakian, G. F. Mkrtchian

Physical Review B 2023 165410

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### *Article*

#### **Генерация высоких гармоник в треугольных квантовых графеновых точках**

Б. Р. Авчян, А. Г. Казарян, К. А. Саргсян, Х. В. Седракиан

Журнал экспериментальной и теоретической физики (Journal of Experimental and Theoretical Physics)

2022 155-165

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### *Article*

#### **High Harmonic Generation in Triangular Graphene Quantum Dots**

B. R. Avchyan, A. G. Ghazaryan, K. A. Sargsyan, Kh. V. Sedrakyan

Journal of Experimental and Theoretical Physics 2022 125-134

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### *Article*

#### **High harmonic generation with many-body Coulomb interaction in rectangular graphene quantum dots of armchair edge**

Babken R. Avchyan, Armenuhi G. Ghazaryan, Samvel S. Israelyan, Khachik V. Sedrakian

Journal of Nanophotonics 2022 036001: 1-12

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### *Article*

#### **On Laser-Induced High-Order Wave Mixing and Harmonic Generation in a Graphene Quantum Dot**

B. R. Avchyan, A. G. Ghazaryan, K. A. Sargsyan, Kh. V. Sedrakian

JETP Letters 2022 428-435

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### *Article*

#### **О лазерно-индуцированной генерации высших гармоник и смещении волн высокого порядка в графеновой квантовой точке**

Авчян Б. Р., Казарян А. Г., Саргсян К.А., Седракиан Х. В.

Письма в Журнал экспериментальной и теоретической физики (Journal of Experimental and Theoretical Physics Letters)

2022 426-433

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### *Article*

#### **ОТКЛИК ВЫСШИХ ГАРМОНИК ИНТЕНСИВНОГО КОГЕРЕНТНОГО ЭЛЕКТРОМАГНИТНОГО ПОЛЯ НА ИЗМЕНЕНИЕ ТОПОЛОГИИ ПОВЕРХНОСТИ ФЕРМИ В ГРАФЕНОПОДОБНЫХ НАНОСИСТЕМАХ**

Авчян Б. Р., Казарян А. Г., Саргсян К. А., Седракиан Х. В.

Журнал экспериментальной и теоретической физики (Journal of Experimental and Theoretical Physics)

2021 1003-1012

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### *Article*

#### **Fermi Surface Topology Signature on the High Harmonics Generation in Graphene-Like Nanostructure**

B. R. Avchyan, A. G. Ghazaryan, K. A. Sargsyan, Kh. V. Sedrakian

*Article*

**High-harmonic generation at particle-hole multiphoton excitation in gapped bilayer graphene**

Hamlet K. Avetissian, Ara K. Avetissian, Armenuhi G. Ghazaryan, Garnik F. Mkrtchian,

Khachik V. Sedrakian

Journal of Nanophotonics 2020 026004(1-15)

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*Article*

**High harmonics generation in bilayer graphene at high Fermi energies induced by coherent THz-radiation**

Armenuhi G. Ghazaryan, Hrant H. Matevosyan, Khachik V. Sedrakian

Journal of Nanophotonics 2020 046009(1-15)

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*Article*

**Third harmonic generation in gapped bilayer graphene**

Ara Karapet Avetissian, Armenuhi Gevorg Ghazaryan, Khachik Vazgen Sedrakian

Journal of Nanophotonics 2019 036010(1-13)

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*Article*

**Microscopic nonlinear quantum theory of absorption of coherent electromagnetic radiation in doped bilayer graphene**

Armenuhi G. Ghazaryan, Khachik V. Sedrakian

Journal of Nanophotonics 2019 046008(1-14)

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*Article*

**Multiphoton cross sections of conductive electrons stimulated bremsstrahlung in doped bilayer graphene**

Armenuhi G. Ghazaryan, Khachik V. Sedrakian

Journal of Nanophotonics 2019 046004(1-14)

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*Article*

**Microscopic nonlinear quantum theory of absorption of strong electromagnetic radiation in doped graphene**

Ara Karapet Avetissian, Armenuhi Gevorg Ghazaryan, Khachik Vazgen Sedrakian,

Babken Ruben Avchyan

Journal of Nanophotonics 2018 016006/12

<https://spie.org/publications/journals/journal-of-nanophotonics>

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*Article*

**High harmonic generation in Landau-quantized graphene subjected to a strong electromagnetic radiation**

Hamlet K. Avetissian, Armenuhi G. Ghazaryan, Garnik F. Mkrtchian, Khachik V. Sedrakian

Journal of Nanophotonics 2017 016004: 1- 9

<https://spie.org/publications/journals/journal-of-nanophotonics>

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*Article*

**Induced nonlinear cross sections of conductive electrons scattering on the charged impurities**

## **in doped graphene**

Avetissian Ara K., Ghazaryan Armenuhi G., Sedrakian Khachik V., Avchyan Babken R.

Journal of Nanophotonics 2017 036004: 1-12

<https://spie.org/publications/journals/journal-of-nanophotonics>

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### *Article*

#### **Generation of high energy electron and positron beams in solid-plasma-nanolayers under relativistic laser pulses**

H.K. Avetissian, A.K. Avetissian, H.H. Matevosyan, G.F. Mkrtchian, Kh.V. Sedrakian

News and Reports from High Energy Density generated by Heavy Ion and Laser Beams 2015 2016 t2-77

[https://repository.gsi.de/record/194814/files/HEDP\\_report\\_\\_2k15\\_web-version.pdf](https://repository.gsi.de/record/194814/files/HEDP_report__2k15_web-version.pdf)

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### *Article*

#### **Production of high energy-solid density electron bunches and hard $\gamma$ -quanta and positron fluxes by ultrarelativistic lasers in solid-plasma targets**

H.K. Avetissian, H. H. Matevosyan, G. F. Mkrtchian, Kh. V. Sedrakian

Physical Review Special Topics-Accelerators and Beams 2015 121301/7

<http://journals.aps.org/prab/about>

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### *Conference*

#### **Nonlinear Absorption of Superintense Linearly Polarized Laser Radiation in Relativistic Plasma via Bremsstrahlung**

A. K. Avetissian, A. G. Ghazaryan, S. S. Israelyan, Kh. V. Sedrakian

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### *Conference*

#### **Landau-quantized graphene in strong radiation field and high harmonic generation**

H.K. Avetissian, A.G. Ghazaryan, G.F. Mkrtchian, Kh.V. Sedrakian

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### *Conference*

#### **Role of Coulomb Forces and Radiation Friction in Laser Production of High Density Electron Beams from Solid-Plazma-Targets**

H.K. Avetissian, S. S. Israelyan, G. F. Mkrtchian, Kh. V. Sedrakian

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### *Conference*

#### **Radiation Induced Nonlinear Cross Sections of Conductive Electrons Scattering on Charged Impurities in Doped Graphene**

A.K. Avetissian, B.R.Avchyan, A.G. Ghazaryan, Kh.V. Sedrakian

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### *Conference*

#### **Nonlinear Absorption Coefficient of Doped Graphene at Conductive Electrons Scattering on Charged Impurities**

A.G. Ghazaryan, B.R. Avchyan, H.H. Matevosyan, Kh.V. Sedrakian

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### *Conference*

#### **Impact of Coulomb collisions on laser-plasma interaction processes at high densities and relativistic intensities**

Ghazaryan A.G., Israelyan S.S., Matevosyan H.H., Sedrakian Kh.V.

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### *Conference*

#### **Impact of Electron-ion Coulomb Interaction in Above Threshold Ionization of Atom in Strong**

**Medium Infrared Laser Field**

Avetissian A.K., Ghazaryan A.G., Sedrakian Kh.V., Avchyan B.R.

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*Conference*

**Nonlinear Absorption Coefficient of Doped Graphene by Conductive Electrons Scattering on Charged Impurities**

A.K. Avetissian, A.G. Ghazaryan, Kh.V. Sedrakian

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*Conference*

**Radiation induced nonlinear cross sections of conductive electrons scattering on charged impurities in bilayer graphene**

A. K. Avetissian, B. R. Avchyan, A. G. Ghazaryan, Kh. V. Sedrakian

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*Conference*

**X-ray Absorption in Plasma by One-photon Stimulated Bremsstrahlung with the Exact Consideration of Coulomb potential**

A.K. Avetissian, A.G. Ghazaryan, Kh.V. Sedrakian

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*Conference*

**Third Order Harmonic Generation in Gapped Bilayer Graphene**

A. K. Avetissian, A. G. Ghazaryan, Kh.V. Sedrakian

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*Conference*

**High-Harmonic Generation in Bilayer Graphene with an Electric Field Induced Band Gap**

A. K. Avetissian, B. R. Avchyan, A. G. Ghazaryan, Kh. V. Sedrakian

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*Conference*

**Microscopic nonlinear quantum theory of strong electromagnetic radiation absorption in doped bilayer graphene**

A. G. Ghazaryan, Kh. V. Sedrakian

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*Conference*

**Higher Harmonic Generation in AB Stacked Bilayer Graphene**

A. G. Ghazaryan, Kh. V. Sedrakian

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*Conference*

**High harmonic generation in plane graphene quantum dots with different shapes and edges**

B. R. Avchyan, K. A. Sargsyan, A. G. Ghazaryan, Kh. V. Sedrakian

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*Conference*

**High harmonic generation at particle-hole multiphoton excitation in gapped bilayer graphene**

H. Avetissian, A. Avetissian, A. Ghazaryan, G. Mkrtchian, Kh. Sedrakian

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*Conference*

**Harmonic generation at low-energy particle-hole excitation in bilayer graphene**

Armenuhi Ghazaryan, Hrant Matevosyan, Khachik Sedrakian

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*Conference*

**High harmonic generation on graphene quantum dots with collective scattering of electrons**

B. Avchyan, A. Ghazaryan, S. Israelyan, Kh. Sedrakian

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*Conference*

**Laser induced high-order wave mixing and multiparticle interaction in graphene quantum dots**

A.G. Ghazaryan, H.H. Matevosyan, Kh.V. Sedrakian

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*Conference*

**Optical anisotropy of high-order harmonic generation in rectangular graphene quantum dots**

B. R. Avchyan, A. G. Ghazaryan, Q. S. Poghosyan, Kh. V. Sedrakian

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*Conference*

**Elliptically Polarized High-order Laser Harmonics in Hexagonal Graphene Quantum Dots**

A. G. Ghazaryan, N. O. Arustamyan, G. H. Chopuryan, Kh. V. Sedrakian

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*Conference*

**High-Order Harmonics Generation in Graphene Quantum Dots by Bichromatic Laser Fields of Circular Polarization**

Kh. V. Sedrakian, H. K. Avetissian, A. G. Ghazaryan, G. F. Mkrtchian

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*Conference*

**High Harmonic Generation in Graphene Quantum Dots with Laser Fields of Elliptic Polarization**

A G. Ghazaryan, H. H. Matevosyan, N. O. Arustamyan, T. M. Markosyan, Kh. V. Sedrakian

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*Conference*

**High Harmonic Generation and Wave Mixing in Graphene Quantum Dots by Bichromatic Laser Fields of Circular Polarization**

H. K. Avetissian, A. G. Ghazaryan, G. F. Mkrtchian, Kh. V. Sedrakian

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*Conference*

**Symmetrically driven enhancement of high harmonic generation in graphene quantum dots**

Armenuhi Gevorg Ghazaryan, Hamlet Karo Avetissian, Garnik Felix Mkrtchian, Khachik Vazgen Sedrakian

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