Hamlet Karo Avetissian

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Education

Institution	Yerevan State University
Faculty	Faculty of Physics, Department of Theoretical Physics
Date	1962 - 1967
Degree name	Qualified specialist

Scientific Rank/degree

Date	1991
Degree name	Professor

Date	1983
Degree name	Doctor
Research Topic	Interaction of charged particles with intense electromagnetic radiation

Language skills

Հայերեն Русский English

Work experience

Institution	Yerevan State University
Period of time	1971 till now
Rank/degree	Head of the Centre of Strong Fields Physics

Publications

Article
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

Results in Physics 2026 108579

https://www.sciencedirect.com/science/article/pii/S2211379726000057

Article

Zeptosecond electron pulse train via multiphoton inelastic Cherenkov diffraction
H. K. Avetissian, G. F. Mkrtchian

Scientific Reports 2026 13939

https://doi.org/10.1038/s41598-026-44500-w

Article

Berry curvature and shift vector effects at high-order wave mixing in biased bilayer graphene
H.K. Avetissian, H.H. Matevosyan, G.F. Mkrtchian

Physical review. B./Physical review. B 2025 045415

Article

High-harmonic spectroscopy of mobility edges in one-dimensional quasicrystals
H. K. Avetissian, B. R. Avchyan, A. Brown, G. F. Mkrtchian

New Journal of Physics 2025 124101

https://iopscience.iop.org/article/10.1088/1367-2630/ae298a

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

2025 364-364

https://www.grapheneconf.com/2025/posters.php

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

2025 16 - 16

https://flatlands2025.org/

Conference

Symmetrically driven enhancement of high harmonic generation in graphene quantum dots
Armenuhi Gevorg Ghazaryan, Hamlet Karo Avetissian, Garnik Felix Mkrtchian, Khachik Vazgen Sedrakian

2025 ID#: 1486

https://ieeenap.org/scientific-program/

Article

Интенсивная генерация высших гармоник в молекуле фуллерена C180 (INTENSE HIGH HARMONIC GENERATION IN FULLERENE MOLECULE C180)
Аветисян Г.К., Казарян А.Г., Матевосян Г.Г., Мкртчян Г.Ф.

Журнал Экспериментальной и Теоретической Физики 2024 25-31

Article

Intense high-order harmonic generation in the giant fullerene molecule C240
H. K. Avetissian, S. Sukiasyan, T. M. Markosyan, G. F. Mkrtchian

Physical review. B./Physical review. B 2024 085401

Article

Intense anomalous high harmonics in graphene quantum dots caused by disorder or vacancies

H. K. Avetissian, G. A. Musayelyan, G. F. Mkrtchian

Physical review. B./Physical review. B 2024 085417

Conference

Berry curvature effects in high-order wave mixing in biased bilayer graphene

H. K. Avetissian, H. H. Matevosyan, G. F. Mkrtchian

2024 1

https://www.grapheneconf.com/2024/index.php

Conference

High-order Harmonic Generation in the Giant Fullerene Molecules

H. K. Avetissian, A. G. Ghazaryan, H. H. Matevosyan, G. F. Mkrtchian

2024 E-FMN-1

https://nanomatsci-com-dot-radiant-century-424110-p9.uc.r.appspot.com/?c=1AZVXZ...

Conference

HIGH HARMONIC GENERATION BY STRONG LASER RADIATION IN FULLERENE MOLECULE C180

H. K. Avetissian, A. G. Ghazaryan, H. H. Matevosyan, G. F. Mkrtchian

2024 25-25

https://nano2024.gtu.ge/

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./Physical review. B 2023 205403

Article

Disorder-induced effects in high-harmonic generation process in fullerene molecules

H.K. Avetissian, S. Sukiasyan, H.H. Matevosyan, G.F. Mkrtchian

Results in Physics 2023 106951/8

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./Physical review. B 2023 165410

Conference

Disorder-Induced Effects in High-Harmonic Generation Process in Fullerene Molecules

H. K. Avetissian, S. Sukiasyan, H. H. Matevosyan, G. F. Mkrtchian

2023 125 - 125

https://flatlands2023.com/

Article

High-order harmonic generation in three-dimensional Weyl semimetals with broken time-reversal symmetry

H. K. Avetissian, V. N. Avetisyan, B. R. Avchyan, G. F. Mkrtchian

Physical review. A/Physical review, A 2022 033107/1-8

Article

Efficient high-harmonic generation in graphene with two-color laser field at orthogonal polarization

Hamlet K. Avetissian, Andreas Knorr, Garnik F. Mkrtchian

Physical review. B./Physical review. B 2022 195405

Article

Saddle-point exciton signature on high-order harmonic generation in two-dimensional hexagonal nanostructures

H. K. Avetissian, S. S. Israelyan, H. H. Matevosyan, G. F. Mkrtchian

Physical review. A/Physical review, A 2022 063504/1-9

Conference

High Harmonic Generation in (3+1)-dimensional Weyl Semimetals

Hamlet Avetissian Karo, Vagharshak Avetisyan Narek, Babken Avchyan Ruben, Garnik Mkrtchian Felix

2022 187 - 187

https://ieeenap.org/ieee-nap22/#:~:text=The%202022%20IEEE%2012th%20Internationa...

Article

Free-electron nanolaser based on graphene plasmons

H. K. Avetissian, B. R. Avchyan, H. H. Matevosyan, G.F. Mkrtchian

Laser Physics 2021 055801

Article

High harmonic generation in fullerene molecules

H. K. Avetissian, A. G. Ghazaryan, G. F. Mkrtchian

Physical review. B./Physical review. B 2021 125436

Conference

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

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

2021 10

http://www.nano2020.gtu.ge/

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)

Article

Many-body effects for excitonic high-order wave mixing in monolayer transition metal dichalcogenides

H. K. Avetissian, G. F. Mkrtchian, K. Z. Hatsagortsyan

Physical Review Research 2020 023072(1-9)

Article

On the extreme nonlinear optics of graphene nanoribbons in the strong coherent radiation fields
Hamlet K. Avetissian, Babken R. Avchyan, Garnik F. Mkrtchian, Karine A. Sargsyan

Journal of Nanophotonics 2020 026018(1-9)

Article

High laser harmonics induced by the Berry curvature in time-reversal invariant materials
H. K. Avetissian, G. F. Mkrtchian

Physical review. B./Physical review. B 2020 245422

Article

Microscopic quantum description of second-order nonlinearities in two-dimensional hexagonal nanostructures beyond the Dirac cone approximation
H. K. Avetissian, G. F. Mkrtchian, K. G. Batrakov, S. A. Maksimenko

Physical review. B./Physical review. B 2020 165406

Article

Higher harmonic generation by massive carriers in buckled two-dimensional hexagonal nanostructures
H. K. Avetissian, G. F. Mkrtchian

Physical review. B./Physical review. B 2019 085432(1-10)

Article

Wave mixing and high harmonic generation at two-color multiphoton excitation in two-dimensional hexagonal nanostructures
H. K. Avetissian, A. K. Avetissian, B. R. Avchyan, G. F. Mkrtchian

Physical review. B./Physical review. B 2019 035434(1-8)

Article

Impact of electron-electron Coulomb interaction on the high harmonic generation process in graphene
H. K. Avetissian, G. F. Mkrtchian

Physical review. B./Physical review. B 2018 115454(1-9)

Article

Multiphoton excitation and high-harmonics generation in topological insulator
H. K. Avetissian, A. K. Avetissian, B. R. Avchyan, G. F. Mkrtchian

JOURNAL OF PHYSICS-CONDENSED MATTER 2018 185302(1-7)

Article

Laser synthesis of hybrid nanoparticles for biomedicine
A.A. Lalayan, H.K. Avetissian

Proceedings of SPIE-Progress in Biomedical Optics and Imaging 2018 10582(1-4)

Article

Multiphoton excitation and harmonic generation from the quantum electrodynamic vacuum
H. K. Avetissian, A. K. Avetissian, B. R. Avchyan, G. F. Mkrtchian

Laser Physics Letters 2018 126003(1-7)

Conference

High harmonics generation with 2D metallic carriers of topological insulators
H. K. Avetissian, A. K. Avetissian, B. R. Avchyan, G. F. Mkrtchian

2018 38

https://indico.jinr.ru/internalPage.py?pageId=10&confId=468

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

Collective two-boson decay of excitons in a Bose-Einstein condensate and generation of coherent photon-phonon radiation
H. K. Avetissian, A. K. Avetissian, G. F. Mkrtchian, B. R. Avchyan

Physical review. B./Physical review. B 2017 045206/6

http://journals.aps.org/prb/

Article

Coherent nonlinear optical response of graphene in the quantum Hall regime
H.K. Avetissian, G.F. Mkrtchian

Physical review. B./Physical review. B 2016 045419/7

http://journals.aps.org/prb/

Article

Enhanced high-order-harmonic generation and wave mixing via two-color multiphoton excitation of atoms and molecules
H.K. Avetissian, B.R. Avchyan, G.F. Mkrtchian

Physical review. A/Physical review, A 2016 013856/7

http://journals.aps.org/pra/

Article

Electron diffraction on a traveling wave: “Inelastic Kapitza–Dirac effect”
H.K. Avetissian

Laser and Particle Beams 2016 1-13

http://iopscience.iop.org/journal/1612-202X

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 էջ-77

https://repository.gsi.de/record/194814/files/HEDP_report__2k15_web-version.pdf

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Article

Nonlinear absorption of high-intensity x-ray radiation in ultradense plasma
H.K. Avetissian, A.K. Avetissian, A.G. Ghazaryan, H.H. Matevosyan, G.F. Mkrtchian

News and Reports from High Energy Density generated by Heavy Ion and Laser Beams 2015 2016 էջ -78

https://repository.gsi.de/record/194814/files/HEDP_report__2k15_web-version.pdf

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Article

Nonlinear response of the quantum Hall system to a strong electromagnetic radiation
H.K. Avetissian, G. F. Mkrtchian

Physics Letters A 2016 3924–3927

http://www.journals.elsevier.com/physics-letters-a

Conference

X-ray Absorption via Electron-ion SB in Maxwellian Plasma at the Exact Consideration of Coulomb Potential
H.K. Avetissian, A.K. Avetissian, A.G. Ghazaryan, G.F. Mkrtchian

2016 1P- 1

http://icops2016.ece.ualberta.ca/

Conference

Landau-quantized graphene in strong radiation field and high harmonic generation
H.K. Avetissian, A.G. Ghazaryan, G.F. Mkrtchian, Kh.V. Sedrakian

2016 78

http://www.nano2016.gtu.ge/

Conference

High Energy-Density Positrons and Gamma-Quanta Fluxes from Nanotargets under Laser Beams of Ultrarelativistic Intensities
H.K. Avetissian
2016 1

http://www.lasphys.com/workshops/lasphys16/

Conference

Influence of excitonic effects on high harmonic generation by strong laser field in gated graphene
H.K. Avetissian, G.F. Mkrtchian

2016 1

Conference

Nonlinear response of graphene quantum Hall system to a strong laser radiation
H.K. Avetissian, G.F. Mkrtchian

2016 1

http://iht.univ.kiev.ua/nanoqt2016/

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

2016 3P-41

http://icops2016.ece.ualberta.ca/

Monograph

Relativistic Nonlinear Electrodynamics: The QED Vacuum and Matter in Super-Strong Radiation Fields
H.K. Avetissian
2016 506

Article

Microscopic nonlinear relativistic quantum theory of absorption of powerful x-ray radiation in plasma

H. K. Avetissian, A. G. Ghazaryan, H. H. Matevosyan, G. F. Mkrtchian

Physical review. E 2015 043103/8

https://journals.aps.org/pre/

Article

Multiphoton interaction of a qutrit with single-mode quantized field in the ultrastrong and deep strong coupling regimes

H.K. Avetissian, A.K. Avetissian, G. F. Mkrtchian, O.V. Kibis

Journal of Nanophotonics 2015 093064/14

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

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Article

Gamma-ray laser based on the collective decay of positronium atoms in a Bose-Einstein condensate

H.K. Avetissian, A.K. Avetissian, G. F. Mkrtchian

Physical review. A/Physical review, A 2015 023820/10

http://journals.aps.org/pra/

Article

Multiphoton dynamics of qutrits in the ultrastrong coupling regime with a quantized photonic field

H.K. Avetissian, A. K. Avetissian, G.F. Mkrtchian, O.V. Kibis

Journal of Experimental and Theoretical Physics 2015 925-933

http://link.springer.com/journal/11447

Article

Production of high energy-solid density electron bunches and hard γ-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

Article

Multiphoton Excitations and Harmonics Generation in Quantum Electrodynamic Vacuum

Avetissian H.K., Avetissian A.K., Avchyan B.R., Mkrtchian G.F.

News and Reports from High Energy Density generated by Heavy Ion and Laser Beams 2015 2015 62

https://repository.gsi.de/record/194814/files/HEDP_report__2k15_web-version.pdf

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Article

Intense Coherent Gamma-Ray Source Based on the Collective Radiation of Positronium Atoms in a Bose-Einstein Condensate

Avetissian H.K., Avetissian A.K., Mkrtchian G.F.

News and Reports from High Energy Density generated by Heavy Ion and Laser Beams 2015 2015 61

https://repository.gsi.de/record/194814/files/HEDP_report__2k15_web-version.pdf

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