

Garnik Felix Mkrtchian

Research Institute of Physics

Leading researcher

☎ 23-91
(060) 71-03-91

✉ mkrтчian@ysu.am



🎓 Education

Institution	Yerevan State University
Faculty	Faculty of Physics, Department of Theoretical Physics, Plasma physics
Date	1989 - 1994
Degree name	Qualified specialist

🎓 Scientific Rank/degree

Institution	Yerevan State University
Date	2009
Degree name	Doctor
Specialty	Physico-mathematical sciences
Research Topic	Study of some induced processes on electron/ion beams and atoms

🌐 Language skills

Հայերեն English Русский

📁 Work experience

Institution	Research Institute for Physics, Centre of Strong Fields Physics
Period of time	2015 till now
Rank/degree	Leading researcher

🔬 Scientific interests

- Nonlinear electrodynamics of nanostructures; Generation of high harmonics; Non-linear Quantum Electrodynamics; X-ray & gamma lasers

🏆 State awards and honorary titles

2003 RA President's Award

📖 Publications

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 2025 045415

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 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 2024 085417

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

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 2023 165410

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 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 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 2022 063504/1-9

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 2021 125436

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

Suppression of intervalley exchange coupling in the presence of momentum-dark states in transition metal dichalcogenides

Malte Selig, Florian Katsch, Samuel Brem, Garnik F. Mkrtchian, Ermin Malic, Andreas Knorr

Physical Review Research 2020 023322(1-17)

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 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 2020 165406

Article

Higher harmonic generation by massive carriers in buckled two-dimensional hexagonal nanostructures

H. K. Avetissian, G. F. Mkrtchian

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 2019 035434(1-8)

Article

Theory of second-order excitonic nonlinearities in transition metal dichalcogenides

Garnik F. Mkrtchian, Andreas Knorr, Malte Selig

Physical Review B 2019 125401(1-14)

Article

Impact of electron-electron Coulomb interaction on the high harmonic generation process in graphene

H. K. Avetissian, G. F. Mkrtchian

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

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)

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>

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 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 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 2016 013856/7

<http://journals.aps.org/pr/>

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

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 t2 -78

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

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>

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>

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 2015 023820/10

<http://journals.aps.org/pr/>

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

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

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

Conference

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

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

Conference

Influence of excitonic effects on high harmonic generation by strong laser field in gated graphene

H.K. Avetissian, G.F. Mkrtchian

Conference

Nonlinear response of graphene quantum Hall system to a strong laser radiation

H.K. Avetissian, G.F. Mkrtchian

Conference

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

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

Conference

High harmonics generation with 2D metallic carriers of topological insulators

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

Conference

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

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

Conference

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

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

Conference

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

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

Conference

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

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

Conference

HIGH HARMONIC GENERATION BY STRONG LASER RADIATION IN FULLERENE MOLECULE C180

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

Conference

High-order Harmonic Generation in the Giant Fullerene Molecules

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