# Mushegh Spartak Rafayelyan


**Research Institute of Physics**
Laboratory of Optoelectronics and Photonics
Head of the center

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**Institute of Physics**
Chair of Optics and Photonics
Assistant

23-21
mushegh.rafayelyan@ysu.am


## Education

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| **Faculty** | Laboratoire Ondes et Matière d'Aquitaine |
| **Date** | 2013 - 2017 |
| **Degree name** | PhD student |

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| **Institution** | Yerevan State University |
| **Faculty** | Faculty of physics |
| **Date** | 2012 - 2015 |
| **Degree name** | PhD student |

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| **Institution** | Yerevan State University |
| **Faculty** | Faculty of physics |
| **Date** | 2010 - 2012 |
| **Degree name** | Masters |

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| **Institution** | Yerevan State University |
| **Faculty** | Faculty of physics |
| **Date** | 2006 - 2010 |
| **Degree name** | Bachelor |

## Scientific Rank/degree

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| **Date** | 2017 |
| **Degree name** | PhD |
| **Scientific Supervisor** | Etienne Brasselet |
| **Research Topic** | Singular Beam Shaping From Spin-Orbit Flat Optics |

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|---|---|
| **Institution** | Yerevan State University |
| **Date** | 2015 |

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| **Degree name** | Candidate |
| **Scientific Supervisor** | Ashot Gevorgyan |
| **Research Topic** | Optical properties of metamaterial-based cholesteric liquid crystals |

## Language skills

Հայերեն English Français Русский

## Work experience

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| **Institution** | Yerevan State University |
| **Period of time** | 2025 till now |
| **Rank/degree** | Head of laboratory |

## Publications

*Article*

**Light-induced isotropic pen for generation of topological solitons and hopfion–toron transition in frustrated chiral nematic films**
Sergey A. Shvetsov, Darina D. Darmoroz, Alexey Vasil'ev, Tetiana Orlova, Igor S. Lobanov,

Mushegh Rafayelyan
Chaos Solitons & Fractals 2025 116905

*Article*

**Rewritable Binary Recording of the Photon Spin State in Chiral Liquid Crystals**
Nicolas Bruni, Charles Loussert, Mushegh Rafayelyan, Tetiana Orlova, Delphine Coursault,

Etienne Brasselet
Physical Review Letters 2025 223804

*Article*

**On-Demand Photopatterned Twisted Nematics for Generation of Polychromatic Vector Fields**
Edvard Grigoryan, Hayk H. Harutyunyan, Hrayr Hakobyan, Sergey A. Shvetsov, Tetiana Orlova,

Mushegh Rafayelyan, Vahram L. Grigoryan

Crystals 2025 877

*Article*

**Single-Path Spatial Polarization Modulation for Vector Transmission Matrix Measurement and Polarization Control in Scattering Media**
Edvard Grigoryan, Aram Sargsyan, Tatevik Sarukhanyan, Mushegh Rafayelyan

Photonics 2025 1145

*Article*

**Nanostructured Material Design via a Retrieval-Augmented Generation (RAG) Approach: Bridging Laboratory Practice and Scientific Literature**
Nikita A. Krotkov, Dmitrii A. Sbytov, Anna A. Chakhoyan, Polina I. Kornienko, Anna A. Starikova,

Maxim G. Stepanov, Anastasiia O. Piven, Timur A. Aliev, Tetiana Orlova, Mushegh S. Rafayelyan,

Ekaterina V. Skorb

Journal of Chemical Information and Modeling 2025 11064-11078

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*Article*

**Low-Loss Multimode Waveguide Bends with Direct Laser Writing in Polymer**
Tigran Baghdasaryan, Neshteh Kourian, Mushegh Rafayelyan, Tatevik Sarukhanyan

Micromachines 2025 1361

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*Article*

**Light-controllable liquid crystal platform for microparticle oscillations and transport**
Sergey Shvetsov, Tetiana Orlova, Aleksandr Hayrapetyan, Alexey Vasil'ev, Mushegh Rafayelyan

Soft Matter 2024 6920-6928

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*Conference*

**Nonlinear spatiotemporal dynamics of liquid crystals under the illumination of an inhomogeneous light field**
A. Mirzoyan, M. Rafayelyan, V. Grigoryan

2023 81 - 81

https://photonicsai.com/optics11/

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*Conference*

**Bragg-Berry cavities: orbital angular momentum manipulation of broadband light beams**
Sergey Shvetsov, Vahram Grigoryan, Valeri Abrahamyan, Nune Hakobyan, Hakob Margaryan,

Mushegh Rafayelyan

2023 110 - 110

https://photonicsai.com/optics11/

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*Article*

**Tunable spin-glass optical simulator based on multiple light scattering**
Gianni Jacucci, Louis Delloye, Davide Pierangeli, Mushegh Rafayelyan, Claudio Conti, Sylvain Gigan

Physical review. A/Physical review, A 2022 033502

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*Article*

**Optical cloaking of macroscopic objects by geometric-phase vortex processing**
Mushegh Rafayelyan, Henrik Melkonyan, Arman Tigranyan, Etienne Brasselet

Journal of Optics 2022 094005

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*Article*

**Light localization in 1D chirped photonic crystals**
A. H. Gevorgyan, N. A. Vanyushkin, M. S. Rafayelyan

The European Physical Journal Plus 2022 719/1-8

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*Article*

**Asymptotic Stability in Reservoir Computing**
Mushegh Rafayelyan, Jonathan Dong, Erik Börve, Michael Unser

IEEE Xplore 2022 01-08

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*Article*

**Особенности поглощения света в чирпированных одномерных фотонных кристаллах**
А.А. Геворгян, Н.А. Ванюшкин, И.М. Ефимов, С.С. Голик, С.А. Мхитарян, М.З. Арутюнян,

М.С. Рафаелян

Оптика и спектроскопия (Optics and Spectroscopy) 2022 1583-1589

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*Article*

**Magnetically Induced Transparency in Media with Helical Dichroic Structure**
Mushegh S. Rafayelyan, Gvidon K. Matinyan, Hermine Gharagulyan, Tatevik M. Sarukhanyan,

Meruzhan Z. Hautyunyan, Ilya M. Efimov, Nikolay A. Vanyushkin, Sergey S. Golik, Ashot H. Gevorgyan

MATERIALS 2021 2172

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*Article*

**Scalable spin-glass optical simulator**
Mushegh Rafayelyan, Davide Pierangeli, Claudio Conti, Sylvain Gigan

PHYSICAL REVIEW APPLIED 2021 034087

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*Article*

**Multimode Robust Lasing in a Dye-Doped Polymer Layer Embedded in a Wedge-Shaped Cholesteric**
Tatevik M. Sarukhanyan, Hermine Gharagulyan, Mushegh S. Rafayelyan, Sergey S. Golik,

Ashot H. Gevorgyan, Roman B. Alaverdyan

Molecules 2021 6089

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*Conference*

**The role of the geometric phase in cholesteric with a defect layer toward multimodal robust lasing**
T.M. Sarukhanyan, M.S. Rafayelyan, H. Gharagulyan, R.B. Alaverdyan, S.S. Golik, A.H. Gevorgyan

2021 46 - 46

https://ipr.sci.am/pl/conferences/archive.html

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*Article*

**Large-Scale Optical Reservoir Computing for Spatiotemporal Chaotic Systems Prediction**
Mushegh Rafayelyan, Jonathan Dong, Yongqi Tan, Florent Krzakala, Sylvain Gigan

Physical Review X 2020 041037

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*Article*

**Reservoir Computing meets Recurrent Kernels and Structured Transforms**
Mushegh Rafayelyan, Jonathan Dong, Ruben Ohana, Florent Krzakala

Advances in Neural Information Processing Systems 2020 16785-16796

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*Article*

**Optical Reservoir Computing Using Multiple Light Scattering for Chaotic Systems Prediction**
Jonathan Dong, Mushegh Rafayelyan, Florent Krzakala, Sylvain Gigan

IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS 2020 1-12

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*Article*

**Spin-to-orbital angular momentum mapping of polychromatic light**
Mushegh Rafayelyan, Etienne Brasselet

Physical Review Letters 2018 213903

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*Article*

**Ultrabroadband gradient-pitch Bragg-Berry mirrors**
Mushegh Rafayelyan, Gonzague Agez, Etienne Brasselet

Physical review. A/Physical review, A 2017 043862

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*Article*

**Laguerre-Gaussian quasi-modal q-plates from nanostructured glasses**
Mushegh Rafayelyan, Titas Gertus, Etienne Brasselet

Applied Physics Letters 2017 261108

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*Article*

**Laguerre–Gaussian modal q-plates**
Mushegh Rafayelyan, Etienne Brasselet

Optics Letters 2017 1966-1969

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*Article*

**Spin-orbit optomechanics of optically levitated chiral Bragg microspheres**
Georgiy Tkachenko, Mushegh Rafayelyan, Etienne Brasselet

Physical review. A/Physical review, A 2017 053839

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*Article*

**Reflective spin-orbit geometric phase from chiral anisotropic optical media**
Georgiy Tkachenko, Mushegh Rafayelyan, Etienne Brasselet

Physical Review Letters 2016 253902

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*Article*

**Bragg-Berry mirrors: reflective broadband q-plates**
Mushegh Rafayelyan, Etienne Brasselet

Optics Letters 2016 3972-3975

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