# Minas Karapet Balyan


28-43

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**Կոնդենսացված վիճակի ֆիզիկայի կենտրոն**
Պինդ մարմնի ֆիզիկայի լաբորատորիա
Senior Researcher

**Research Institute of Physics**
Կոնդենսացված վիճակի ֆիզիկայի կենտրոն
Պինդ մարմնի ֆիզիկայի լաբորատորիա
Senior Researcher


## Education

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| **Institution** | Yerevan State University |
| **Faculty** | physics |
| **Date** | 1975 - 1984 |
| **Degree name** | PhD student |

## Scientific Rank/degree

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| **Institution** | Yerevan State University |
| **Date** | 2017 |
| **Degree name** | Doctor |
| **Research Topic** | THEORY OF X-RAY DIFFRACTED WAVEFIELDS, DYNAMICAL COHERENT HOLOGRAPHY AND INTERFEROMETRY |

## Language skills

Հայերեն English Русский

## Work experience

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| **Institution** | Yerevan State University |
| **Period of time** | 1980 till now |
| **Rank/degree** | senior researcher |

## Membership

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| **Institution** | International union of crystallography |
| **Period of time** | 1994 till now |

## Publications

*Article*

**X-ray dynamical diffraction wavefront division interferometer (double-slit diffraction) with an asymmetric monochromator. Corrigendum**

Vahram Mkrtchyan, Minas Balyan, Sargis Petrosyan, Ashot Aivazyan

Acta Crystallographica Section A Foundations and Advances 2026 228

https://doi.org/10.1107/s2053273326002287

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*Article*

**X-Ray Dynamical Diffraction Interferometer with Wave Front Division Using Two Asymmetrical Reflections [Рентгеновский динамический дифракционный интерферометр с разделением волнового фронта с использованием двух асимметричных отражений]**

M. K. Balyan, V. P. Mkrtchyan, A. P. Aivazyan, S. A. Petrosyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2026 62-70

https://link.springer.com/article/10.1134/S1068337226700301

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*Article*

**Analysis of Surface States of Crystals Using Ideas of Dynamical Theory of Diffraction [Анализ поверхностных состояний кристалла с использованием идей динамической теории дифракции]**

M. K. Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2026 76-83

https://link.springer.com/article/10.1134/S1068337226700295

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*Article*

**Electronic states in a semiconductor nanobelt in the two-wave approximation**

Minas Balyan, Vram Mughnetsyan, Albert Kirakosyan

Physics Letters A 2026 132007

https://doi.org/10.1016/j.physleta.2026.132007

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*Article*

**Electronic states in a bending semiconductor nanobelt within the framework of finite potential well approximation**

Minas Balyan, Vram Mugnetsyan, Albert Kirakosyan

Micro and Nanostructures 2026 208850

https://doi.org/10.1016/j.micrna.2026.208850

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*Article*

**Double−Slit X-Ray Dynamical Diffraction in the Transmitted Beam [Рентгеновская динамическая дифракция на двух щелях в проходящем пучке]**

A. P. Aivazyan, M. K. Balyan, S. A. Petrosyan, V. P. Mkrtchyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2025 101-107

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*Article*

**Double-slit X-ray dynamical diffraction in elastically deformed crystals**

Minas K. Balyan

Acta Crystallographica Section A Foundations and Advances 2025 294-305

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*Article*

**X-ray dynamical diffraction wavefront division interferometer (double-slit diffraction) with an asymmetric monochromator**
Vahram Mkrtchyan, Minas Balyan, Sargis Petrosyan, Ashot Aivazyan

Acta Crystallographica Section A Foundations and Advances 2025 438-448

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*Conference*

**Double–Slit X–ray Dynamical Diffraction in the Transmitted and Diffracted Beams**
A. P. Aivazyan, M. K. Balyan, S. A. Petrosyan, V. P. Mkrtchyan

2025 70 - 70

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*Article*

**Double-slit asymmetrical dynamical diffraction of X-rays in ideal crystals**
Minas Balyan

Acta Crystallographica Section A Foundations and Advances 2024 161-166

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*Article*

**Measurements of the geometrical characteristics and refractive index of specimens made with X-ray interferometers**
Vahram Mkrtchyan, Ashot Aivazyan, Sargis Petrosyan, Minas Balyan

Journal of Applied Crystallography 2024 499-502

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*Article*

**Diffraction Fields and Fields of Charges, Expressed in Terms of Hertz Vector in Electrodynamics**
M. K. Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2023 92-98

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*Article*

**Double-slit X-ray dynamical diffraction in curved crystals**
Minas K. Balyan

Acta Crystallographica Section A Foundations and Advances 2023 353-359

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*Article*

**Vector Monochromatic Diffraction Fields and Fields of Charges in Electrodynamics**
M. K. Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2023 188-192

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*Article*

**Electromagnetic Vector Monochromatic Diffraction Fields and Fields of Charges in Media**
M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2023 251-256

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*Article*

**Vector Non-Stationary Electromagnetic Diffraction Fields and Fields of Charges in Media**
M. K. Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2023 349-354

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*Article*

**Rocking Curves of X-Ray Asymmetrical Laue Diffraction in a Crystal with the Third-Order**

**Nonlinear Response**
M.K. Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2022 91-97

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*Article*
**X-ray third-order nonlinear diffraction in the asymmetric reflection geometry**
Minas K. Balyan
Acta Crystallographica Section A Foundations and Advances 2022 349-358

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*Article*
**Fields of Charges and Diffraction Fields in Electrodynamics**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2022 331-341

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*Article*
**Coherence Requirements for X-Ray Dynamical Diffraction Talbot Effect Inside a Crystal**
M. K. Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2021 55–59

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*Article*
**X-ray dynamical diffraction Talbot effect behind a crystal in free space**
Minas Balyan, Levon Levonyan, Karapet Trouni
Acta Crystallographica Section A Foundations and Advances 2021 149-159

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*Article*
**Hard X-Ray Off-Axis Fresnel Holography using Two-Block Fresnel Zone Plate Interferometer**
L.A.Haroutunyan, M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2021 154-157

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*Article*
**X-ray third-order nonlinear asymmetric diffraction in the transmission geometry**
M.K.Balyan
Physica Scripta 2021 125006 (21)

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*Article*
**X-Ray Dynamical Diffraction Analogue of Talbot Effect in Case of Incident Finite Front Wave**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 70-76

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*Article*
**Testing of a `hard' X-ray interferometer for experimental investigations**
Tigran H. Eyramjyan, Mesrop H. Mesropyan, Tamara S. Mnatsakanyan, Minas K. Balyan
Acta Crystallographica Section A Foundations and Advances 2020 390-394

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*Article*
**Investigation of third-order nonlinear dynamical X-ray diffraction based on a new exact solution**
Minas K. Balyan
Journal of Synchrotron Radiation 2020 941-952

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*Article*

**РЕНТГЕНОВСКАЯ ФРЕНЕЛЕВСКАЯ ОСЕВАЯ ГОЛОГРАФИЯ С ИСПОЛЬЗОВАНИЕМ ТРЕХБЛОЧНОГО ИНТЕРФЕРОМЕТРА ИЗ ФРЕНЕЛЕВСКИХ ЗОННЫХ ПЛАСТИН**

Л.А. АРУТЮНЯН, М.К. БАЛЯН

Proceedings of NAS RA Physics 2020 378-386

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*Article*

**Spherical-wave X-ray dynamical diffraction Talbot effect inside a crystal**

Minas K. Balyan, Levon V. Levonyan, Karapet G. Trouni

Acta Crystallographica Section A Foundations and Advances 2020 494-502

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*Article*

**X-ray two-wave dynamical diffraction analogue of Talbot effect**

M K Balyan

Journal of Optics 2019 055603(1-14)

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*Article*

**Dependence of X-ray asymmetrical Bragg case plane-wave rocking curves on the deviation from exact Bragg orientation in and perpendicular to the diffraction plane**

Minas K. Balyan

Acta Crystallographica Section A Foundations and Advances 2019 517-526

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**An X-Ray Dynamical Diffraction Analogue of Talbot Effect in the Transmitted Beam**

M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2019 253-261

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**X-ray dynamical diffraction analogues of the integer and fractional Talbot effects**

Minas K. Balyan

Journal of Synchrotron Radiation 2019 1650-1659

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*Conference*

**X-ray dynamical diffraction Talbot effect under the condition of two-wave dynamical diffraction in crystals**

M.K.Balyan

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*Conference*

**X-ray LLL interferometer with wedge-shaped mirror plate**

Tigran H. Eyramjyan, Tamara S. Mnatsakanya, Minas K. Balyan

2019 64-64

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*Conference*

**Hard X-Ray Fourier Transform Holography Based on Two-Block Fresnel Zone Plate Interferometer with Common Optical Axis**

L.A. Haroutunyan, M.K.Balyan

2019 57-58

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**Rocking Curves of X-ray Asymmetrical Laue Diffraction with Two-Dimensional Curvature of Wave Front**

M. K. Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2018 85-91

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*Article*

**X-ray Fourier transform holography by amplitude-division-type Fresnel zone plate interferometer**

Minas Balyan, Levon Haroutunyan

Journal of Synchrotron Radiation 2018 241-247

http://journals.iucr.org/s/issues/2018/01/00/mo5163/index.html

*Article*

**Dependence of X-ray plane-wave rocking curves on the deviation from exact Bragg orientation in and perpendicular to the diffraction plane for the asymmetrical Laue case**

Minas K. Balyan

Acta Crystallographica Section A Foundations and Advances 2018 204-215

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*Article*

**Rocking Curves of X-Ray Asymmetric Bragg Diffraction with Two-Dimensional Curvature of Wave Front**

M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2018 166-174

*Article*

**Experimental and theoretical investigations of an X-ray LLL interferometer with a wedge-shaped mirror plate**

Tigran H. Eyramjyan, Tamara S. Mnatsakanyan, Minas K. Balyan

Acta Crystallographica Section A Foundations and Advances 2018 595-599

*Article*

**X-ray nonlinear Bragg diffraction**

Minas K. Balyan

Journal of Nanophotonics 2017 016003-1 - 016-6

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

*Article*

**X-RAY THIRD-ORDER NONLINEAR RENNINGER EFFECT AND ROCKING CURVES**

M.K.Balyan

Proceedings of the YSU A Physical and Mathematical Sciences 2017 85-88

http://www.ysu.am/science/en/journals

*Article*

**Rocking Curves in the Laue Geometry Depending on the Departure of Incident Plane X-ray Wave from the Bragg Condition in the Diffraction Plane and in the Direction Perpendicular to**

**the Diffraction Plane**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2017 102-109
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*
**X-Ray Interferometric Moire Fringes in the Presence of Temperature Gradient within the Frameworks of Eikonal Approximation**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2017 161-166
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*
**X-ray interferometric Fresnel Holography**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2016 79-88
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*
**Third-order nonlinear and linear time-dependent dynamical diffraction of X-rays in crystals**
Minas K.Balyan
Journal of Synchrotron Radiation 2016 919-928
http://journals.iucr.org/s/

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*Article*
**Рентгеновская интерферометрическая Фурье-голография**
М.К.Балян
Proceedings of NAS RA Physics 2016 388-401
http://www.flib.sci.am/eng/Fizika/Frame.html

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*Article*
**X-ray third-order nonlinear plane-wave Bragg-case dynamical diffraction effects in a perfect crystal. Erratum**
Minas K.Balyan
Journal of Synchrotron Radiation 2016 1272-1272
http://journals.iucr.org/s/

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*Article*
**Diffraction of X-ray spatially inhomogeneous beam in a crystal with cubic nonlinearity**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2016 391-397
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*
**X-ray Plane-Wave Diffraction Effects in a Crystal with Third-Order Nonlinearity**
M.K.Balyan
Crystallography Reports 2016 1039-1046
http://link.springer.com/journal/11445

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*Article*

**X-ray Interferometric Fourier Holography**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2016 289-298
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Conference*
**X-ray interferometric temperature gradient moire fringes in the frame of eikonal approximation**
Minas Balyan
2016 61-61
http://www.rau.am/optics2016/

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*Conference*
**X-ray nonlinear Bragg diffraction**
Minas Balyan
2016 102-102
http://www.rau.am/optics2016/

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*Conference*
**X-Ray Dynamical Diffraction 'Third Order Nonlinear Renninger Effect'**
Minas Balyan
2016 1-1
http://waset.org/abstracts/55035

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*Conference*
**Mathematical Reconstruction of an Object Image Using X-Ray Interferometric Fourier Holography Method**
M.K.Balyan
2016 1-1
http://waset.org/abstracts/56283

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*Conference*
**X-Ray Dynamical Diffraction Rocking Curves in Case of Third Order Nonlinear Renninger Effect**
Minas Balyan
2016 2-2
https://www.waset.org/abstracts/56984

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*Conference*
**Mathematical reconstruction of an object image using X-ray interferometric Fourier holography method**
M.K.Balyan
2016 477-481
http://waset.org/Publication/mathematical-reconstruction-of-an-object-image-usi...

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*Article*
**Bragg diffraction of spherical X-ray wave with allowance for two-dimensional curvature of wavefront**
M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2015 134-143

http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

*Article*

**X-ray third-order nonlinear plane-wave Bragg-case dynamical diffraction effects in a perfect crystal**

Minas K.Balyan

Journal of Synchrotron Radiation 2015 1410-1418

http://journals.iucr.org/s/

*Article*

**X-ray crystall-diffraction Fourier holography**

M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2015 394-403

http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

*Article*

**X-ray third-order nonlinear dynamical diffraction of X-rays in a crystal**

M.K.Balyan

Crystallography Reports 2015 993-1000

http://link.springer.com/journal/11445

*Article*

**Numerical reconstruction of an object image using an X-ray dynamical diffraction Fraunhofer hologram**

Minas K.Balyan

Journal of Synchrotron Radiation 2014 127-130

http://journals.iucr.org/s/

*Article*

**Object image correction using an X-ray dynamical diffraction Fraunhofer hologram**

Minas K.Balyan

Journal of Synchrotron Radiation 2014 449-451

http://journals.iucr.org/s/

*Article*

**X-ray Laue diffraction with allowance for second derivatives of amplitudes in dynamical diffraction equations**

M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2014 130-141

http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

*Article*

**X-ray Bragg diffraction with allowance for the second derivatives of amplitudes in the dynamical diffraction equations**

M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2014 284-294

http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

*Article*

**Theoretical consideration of an X-ray Bragg-reflection lens using the eikonal approximation**

Minas K.Balyan
Journal of Synchrotron Radiation 2014 700-707
http://journals.iucr.org/s/

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*Article*

**X-ray Laue diffraction with allowance for two-dimensional curvature of wave front: the concept of locally plane wave**

M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2014 446-450
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*

**Measurement of the refractive index of nematic liquid crystals 5CB by means of x-ray interferometry**

Mkrtchyan V. P., Gasparyan L. G., Dadalyan T. K., Balyan M. K., Kuyumchyan A. V.
Proceedings of SPIE - The International Society for Optical Engineering 2014 920714
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*Conference*

**Measurement of the Refractive Index of Nematic Liquid Crystals 5CB by Means of X-ray Interferometry**

V.P.Mkrtchyan, L.G.Gasparyan, T.K.Dadalyan, M.K.Balyan, A.V.Kuyumchyan
2014 1-7
https://www.spiedigitallibrary.org/conference-proceedings-of-spie/9207/1/Measur...

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*Article*

**Transport equations of amplitudes in the eikonal approximation of dynamical diffraction equations**

M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2013 46-50
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*

**Eikonal approximation of dynamical diffraction equations for X-ray beams with two dimensional curvature of the wave-front. I. Basic formulas**

M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2013 144-146
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*

**Eikonal approximation of dynamical diffraction equations for X-ray beams with a two dimensional curvature of the wave front . II. Focusing of an X-ray beam by a crystal with non-plane entrance and exit surfaces. Symmetrical Laue case.**

M.K.Balyan
Journal of Contemporary Physics (Armenian Academy of Sciences) 2013 247-252
http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*

**X-ray dynamical diffraction Fraunhofer holography**

MIinas K.Balyan

Journal of Synchrotron Radiation 2013 749-755

http://journals.iucr.org/s/

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*Article*

**Eikonal approximation in the theory of X-ray interferometer**

M.K.Balyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2012 241-247

http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*

**X-ray zone plates in combination with diffraction reflection**

M.K.Balyan, A.H.Grigoryan, A.H.Toneyan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2011 130-134

http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958

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*Article*

**Study of the X-ray anisotropy of materials via X-ray interferometry**

V.P.Mkrtchyan, L.G.Gasparyan, M.K.Balyan

Inorganic Materials 2011 1676-1680

http://link.springer.com/journal/10789

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*Article*

**X-ray focusing by the system of lens(es) placed inside asymmetric channel-cut crystals**

Minas K.Balyan, Arshak H.Grigoryan, Albert H.Toneyan

Journal of Synchrotron Radiation 2010 332-347

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*Article*

**Double slit dynamical diffraction of X-rays in ideal crystals (Laue case)**

Minas K. Balyan

Acta Crystallographica Section A Foundations and Advances 2010 660-668

http://journals.iucr.org/a/

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*Article*

**Исследование рентгено-оптической анизотропии материалов рентгеноинтерферометрическим методом**

Л.Г.Гаспарян, В.П.Мкртчян, М.К.Балян

Заводская лаборатория. Диагностика материалов. 2010 27-31

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*Article*

**Искусственная ультразвуковая анизотропия кристаллов в области рентгеновских частот**

Л.Г. Гаспарян, В.П. Мкртчян, М.К. Балян, А.С. Мелконян

Proceedings of NAS RA Physics 2007 242-249

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*Article*

**Модуляция рентгеновского пучка на основе модуляции кристаллической решетки**

М.К.Балян, Л.А.Арутюнян

Proceedings of NAS RA Physics 2006 50-55

http://www.flib.sci.am/eng/Fizika/Frame.html

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*Article*

**Температурная искусственная анизотропия кристаллов в области рентгеновских частот**
Л.Г. Гаспарян, В.П. Мкртчян, М.К. Балян, А.Г. Григорян

Proceedings of NAS RA Physics 2006 374-378

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*Article*

**О возможности создания новой дифракционно-рефракционной линзы для жесткого рентгеновского излучения**
М.К.Балян, Л.Г.Гаспарян, А.Г.Григорян, М.М.Агасян

Proceedings of NAS RA Physics 2004 262-264

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*Article*

**X-ray Diffraction Investigations of Microstructure of calcium Hydroxide Crystallites in the Interfacial Transition Zone of Concrete**
Valeri S.Harutyunyan, Vahram P.Mkrtchyan, Minas K.Balyan, Ashot P.Aivazyan, Eduard S. Abovyan,

Paulo J.M.Monteiro

Journal of the American Ceramic Society 2003 2162-2166

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*Article*

**Micro strain distribution in calcium hydroxide present in the interfacial transition zone**
V.S.Harutyunyan, V.P.Mkrtchyan, M.K.Balyan, E.S.Abovyan, P.J.M.Monteyro

Cement and Concrete Research 2000 709-713

http://www.journals.elsevier.com/cement-and-concrete-research

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*Article*

**Усовершенствованная теория дифракции рентгеновских волн в условиях зеркального отражения**
М.К.Балян, Л.В.Левонян

Proceedings of NAS RA Physics 2000 309-319

http://www.flib.sci.am/eng/Fizika/Frame.html

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*Article*

**Влияние внешних воздействий на Брэгг-Лауэвскую дифракцию рентгеновских лучей**
Л.Г.Гаспарян, В.П. Мкртчян, А.Г. Григорян, М.К.Балян, С.А. Валасанян

Proceedings of NAS RA Physics 2000 28-37

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*Article*

**Исследование особенностей дифракции X-лучей в сочетаниях Брэгг-Лауэвских отражений**
Л.Г.Гаспарян, В.П.Мкртчян, М.К.Балян, А.Г.Григорян, С.А.Валасанян

Proceedings of NAS RA Physics 1999 162-171

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*Article*

**Интерпретация электронно-микроскопических решеточных полос**
М.К.Балян, А.М.Арустамян, К.Т.Габриелян

Кристаллография (Crystallography Reports) 1995 18-20

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**Электронно-микроскопические картины муара слабодеформированных кристаллов**
М.К.Балян, К.Т.Габриелян

Proceedings of NAS RA Physics 1994 82-89

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**О возможности создания короткофокусной вертикально фокусирующей рентгенодифракционной линзы**
Л.В.Левонян, М.К.Балян

Письма в журнал технической физики (Technical Physics Letters) 1993 47-50

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**Two –dimentional diffraction focusing of X-ray Radiation in Laue Geometry**
L.V.Levonyan, M.K.Balyan

PHYSICA STATUS SOLIDI A-APPLICATIONS AND MATERIALS SCIENCE 1993 247-255

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Алумян К.В., Багдасарян Р.И., Балян М.К.

Кристаллография (Crystallography Reports) 1983 1024-1025

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**Влияние кристаллических искажений на образование и вид маятниковых полос, II**
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