

# Minas Karapet Balyan

## Research Institute of Physics

Laboratory of Solid State Physics

Senior researcher

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ℝ<sup>6</sup>

## Education

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<b>Institution</b>	Yerevan State University
<b>Faculty</b>	physics
<b>Date</b>	1975 - 1984
<b>Degree name</b>	PhD student

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## Scientific Rank/degree

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<b>Institution</b>	Yerevan State University
<b>Date</b>	2017
<b>Degree name</b>	Doctor
<b>Specialty</b>	Physico-mathematical sciences
<b>Research Topic</b>	THEORY OF X-RAY DIFFRACTED WAVEFIELDS, DYNAMICAL COHERENT HOLOGRAPHY AND INTERFEROMETRY

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## Language skills

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Հայերեն English Русский

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## Work experience

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<b>Institution</b>	Yerevan State University
<b>Period of time</b>	1980 till now
<b>Rank/degree</b>	leading scientiphyk researcher

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## Scientific interests

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- X-ray dynamical diffraction, X-ray holography and interferometry, X-ray optics
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## Membership

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<b>Institution</b>	International union of crystallography
<b>Period of time</b>	1994 till now

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*Article*

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

Minas K. Balyan

Acta Crystallographica A-Foundation and Advances 2025 294-305

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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*

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

Vahram Mkrtchyan, Minas Balyan, Sargis Petrosyan, Ashot Aivazyan

Acta Crystallographica A-Foundation and Advances 2025 438-448

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*Article*

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

Minas Balyan

Acta Crystallographica A-Foundation 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 A-Foundation 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 A-Foundation 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 A-Foundation 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. Eyrarmjyan, Mesrop H. Mesropyan, Tamara S. Mnatsakanyan, Minas K. Balyan

Acta Crystallographica A-Foundation 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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 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 A-Foundation 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 A-Foundation and Advances 2019 517-526

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*Article*

**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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*Article*

**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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*Article*

**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

<https://link.springer.com/article/10.3103/S1068337218010103>

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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>

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*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 A-Foundation and Advances 2018 204-215

<https://onlinelibrary.wiley.com/doi/full/10.1107/S205327331800181X>

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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

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*Article*

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

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

Acta Crystallographica A-Foundation and Advances 2018 595-599

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*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>

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*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>

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*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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## **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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 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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*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>

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*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/>

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*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>

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*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>

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*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

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*Article*

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

Minas K.Balyan

Journal of Synchrotron Radiation 2014 449-451

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*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>

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*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>

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*Article*

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

Minas K.Balyan

Journal of Synchrotron Radiation 2014 700-707

*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

<http://spie.org/publications/conference-proceedings>

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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**

Mlinas 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

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

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Article

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

Minas K. Balyan

Acta Crystallographica A-Foundation 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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2007 242-249

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Article

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

М.К.Балян, Л.А.Арутюнян

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2006 50-55

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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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2004 262-264

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

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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

[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1551-2916](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1551-2916)

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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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2000 28-37

*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

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 1999 162-171

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

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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

<http://www.maik.ru/ru/journal/krist/>

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*Article*

**Электронно-микроскопические картины муара слабдеформированных кристаллов**

М.К.Балян, К.Т.Габриелян

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*Article*

**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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*Article*

**Two -dimensional diffraction focusing of X-ray Radiation in Laue Geometry**

L.V.Levonyan, M.K.Balyan

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[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1862-6319/homepage/2231\\_ed...](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1862-6319/homepage/2231_ed...)

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

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

Кристаллография (Crystallography Reports) 1983 1024-1025

[http://elibrary.ru/title\\_about.asp?id=7861](http://elibrary.ru/title_about.asp?id=7861)

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*Article*

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

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

Кристаллография (Crystallography Reports) 1983 1026-1027

<http://www.maik.ru/ru/journal/krist/>

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*Conference*

**X-ray interferometric temperature gradient moire fringes in the frame of eikonal approximation**

Minas Balyan

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*Conference*

**X-ray nonlinear Bragg diffraction**

Minas Balyan

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*Conference*

**X-Ray Dynamical Diffraction 'Third Order Nonlinear Renninger Effect'**

Minas Balyan

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*Conference*

**Mathematical Reconstruction of an Object Image Using X-Ray Interferometric Fourier Holography Method**

M.K.Balyan

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*Conference*

**X-Ray Dynamical Diffraction Rocking Curves in Case of Third Order Nonlinear Renninger**

## **Effect**

Minas Balyan

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*Conference*

### **Mathematical reconstruction of an object image using X-ray interferometric Fourier holography method**

M.K.Balyan

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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

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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. Eyrarnjyan, Tamara S. Mnatsakanya, Minas K. Balyan

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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

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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

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