CURRICULUM VITAE

Suren Gevorg Khachatryan

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Degree: **Candidate of Physical and Mathematical Sciences (PhD)** in Theoretical Physics
Dissertation Title: *Some Questions in Nonlinear Dynamics of Enclosed Gravitating Discs*
Institution: Yerevan State University, 2000

Education:

1989 – 1994
Honour Diploma in Physics, Chair of Theoretical Physics with major in Mathematical Modeling, Department of Physics, Yerevan State University (YSU)

1994 – 1996
Master of Engineering in Earthquake Engineering, College of Engineering, American University of Armenia (AUA)

1994 – 1997
Post-graduate study in Dynamics of Gravitating Subsystems, Chair of General Physics, Department of Physics, YSU
Fields: *Theoretical Astrophysics*, *Nonlinear Hydrodynamics* and *Computational Physics*

Work Experience:

2001 – present
Assistant Professor (before 2005 – **Lecturer**), College of Science and Engineering (CSE), AUA:

- Introduction to Computer Science
- C++ and Java Programming
- Engineering Analysis with MATLAB
- Data Structures and Algorithms with C++ and Java
- Software Engineering
- Software Engineering using Experimental Case Studies – iCo-op 530278-TEMPUS-1-2012-1-DE-TEMPUS-JPHES
- Practicum in Software Engineering
- Advanced Object-Oriented Programming
- Image Processing
- Math Modeling Applications
- Theory of Computing
- Mechanics
- Relativity
- Quantum Computing
- Leading individual study in Computational Models of Emotional Learning (2012)
- Leading individual study in Lie Groups and Lie Algebras (2013)

- Leading individual studies in Machine Learning (2013)
- Graduate Capstone Preparation
- Supervision of Undergraduate and Graduate Capstone Theses

2012 – 2016

Program Chair, Computer and Information Science (CIS) graduate program, College of Science and Engineering, AUA

2005 – 2007

Director of Instructional Computing Unit (ICU), CSE, AUA:

- Design / review of computing curriculum and other offerings
- Plan, budget and control the ICU activities
- Select and assign instructors, instructional assistants and lab proctors
- Assure, through direction of the Lab Supervisor, the smooth, efficient and secure operation of the instructional computing facilities
- Market courses / offerings
- Coordinate activities with Computer Services, academic programs, etc.
- Serve as an instructor of computing courses

1998 – 2005

Software Instructor, AUA

- Management of MS Windows / Linux operating labs and software teaching
- MS Office applications – basic, advanced and specialized levels
- Program-specific courses – Matlab, SPSS, Visual Basic / VBA

1994 – 2002

Researcher, Department of Physics, YSU, Dynamics of Gravitating Subsystems scientific project:

- Analytical and computational research in nonlinear waves and dynamics of gaseous discs as models of astrophysical objects
- Development and implementation of multi-method numerical integrators of nonlinear partially differential equations describing the models - FDM, FEM, splines, adaptive meshing, time series decomposition, SPH
- N-body simulations
- Study of equilibrium shapes in their applications to dynamics of galaxies and other astrophysical objects

1998 – 1999

Assistant Lecturer, Chair of Informatics, Kh. Abovian Armenian State Pedagogical Institute.

1997 – 1998

On-field Assistant to Architect, KILBORN-SNC Lavalin (Canada), construction of the Ararat Tailing Recovery Plant:

- Site inspections and quality control
- Concrete, aggregate and soil testing
- Assistant to supervisor of electrical / instrumentation division
- Technical and civil translation, interpretation, calculations

1996 – 1997

Geotechnical and Quality Control Engineer, Hakimian Engineering (USA) providing services for Bill Harbert International Constructions (USA), construction of the "Zvartnots" Yerevan Airport Cargo Terminal:

- In-lab and on-field geotechnical and concrete testing
- Inspections and quality control
- Technical and civil translation, interpretation

Scientific Meetings:

2020

International Conference of Students and Young Researchers in Theoretical and Experimental Physics "HEUREKA-2020", Lviv, Ukraine

1. Accepted presentation by S. Hovhannisyan, V. Stepanyan, S. Khachatryan: *Quantum Classification of Even and Odd Functions as an Extention of Deutsch Algorithm*
2. Submitted presentation V. Stepanyan, S. Hovhannisyan, S. Khachatryan: *NP-complete Problems from Physics Perspectives*
3. Submitted presentation T. Yeghiazaryan, S. Khachatryan: *Implementation of Random Forest in Pulsar Detection*

September 24 – 29, 2017

XI International Conference on Computer Science and Information Technologies, Yerevan, Armenia

Contributed talk: *Preliminary Particles Model of Unconstrained Examination Timetabling and its Optimization Using Neural Networks*

September 26 – 28, 2016

International Conference on Perspectives of GPU Computing in Science GPU2016, Department of Physics, La Sapienza University of Rome, Italy

Contributed talk: *Formation of Steady-state Structure in Gravitating Disks by Nonlinear Density Perturbations*

March 17 – 18, 2016

V International Conference on New Perspectives in Science Education, Florence, Italy

Contributed paper: *From Logic Puzzles to Logic Gates – Combining Fun and Practice in Teaching Introduction to Computer Science*

September 28 – October 2, 2015

X International Conference on Computer Science and Information Technologies, Yerevan, Armenia

Contributed talk: *Extracting Meanings from Simple Algorithmic Problems*

June 25 – 29, 2014

Cognition and Action: Jagiellonian-Rutgers Conference in Cognitive Science CogSciJR14, Jagiellonian University, Krakow, Poland

June 16 – 21, 2014

Training of Module Trainers – iCo-op 530278-TEMPUS-1-2012-1-DETEMPUS-JPHES, Ilmenau Technical University, Ilmenau, Germany

September 23 – 27, 2013

IX International Conference on Computer Science and Information Technologies, Yerevan, Armenia

Contributed talk: *A Gate Model of Emotional Learning*

May 13 – 18, 2013

Industrial Cooperation and Creative Engineering Education based on Remote Engineering and Virtual Instrumentation – iCo-op 530278-TEMPUS-1-2012-1-DETEMPUS-JPHES, Transylvania University of Brasov, Romania

September 26 – 30, 2011

VIII International Conference on Computer Science and Information Technologies, Yerevan, Armenia

Contributed talks:

1. *Interacting Particles Method of Recognition of Software Module Clusters*
2. *Interacting Particles Model of Go Game*

September 6 – 10, 2010

Fluid-Kinetic Modelling in Biology, Physics and Engineering, Isaac Newton Institute of Mathematical Sciences, University of Cambridge, UK

August 17 – 21, 2009

Dynamics of Discs and Planets, Isaac Newton Institute of Mathematical Sciences, University of Cambridge, UK

Poster: *2D Density Wave Models in Gravitating Discs*.

February 24 – 26, 2009

The 4th IASME / WSEAS International Conference on Continuum Mechanics, University of Cambridge, UK

Invited paper: *Propagation of 2D Nonlinear Density Waves on an Adaptive Mesh*

February 21 – 23, 2009

The 8th WSEAS International Conference on Signal Processing, Robotics and Automation (ISPRA '09), University of Cambridge, UK

Invited paper: *Color Based Iterative Detection of the Face Vertical Axis*

June 24 – 30, 2007

Symmetry in Nonlinear Mathematical Physics VII International Conference, Kiev, Ukraine

Contributed talk: *On Propagation of 2D Nonlinear Density Waves*

October 17 – 28, 2005

Physics and Theoretical Computer Science, Cargese, Corsica, France

Posters:

1. *Integration along characteristics as an adaptive mesh solution of PDEs*
2. *Quantum Master Mind* (by S. Khachatryan and L. Sargsyan)

December 17 – 19, 2004

Systems Theory and Scientific Computation WSEAS Conference, Puerto De La Cruz, Tenerife, Spain

October 11 – 15, 2004

Large-Scale Computation in Astrophysics, Isaac Newton Institute of Mathematical Sciences, University of Cambridge, UK

September 8 – 20, 2003

Chaotic Worlds: From Order to Disorder in Gravitational N-Body Dynamical Systems NATO ASI, Cortina d'Ampezzo, Italy

Contributed talk: *Modeling of Spiral Structure in Gravitating Gaseous Discs*

July 23 – August 5, 2000

The Restless Universe: Applications of Gravitational N-Body Dynamics to Planetary, Stellar and Galactic Systems NATO ASI, Blair Atholl, Scotland, UK

Contributed talk: *Nonlinear Perturbations in Gravitating Gaseous Disc and the Spiral Structure of Galaxies*

October 11 – 17, 1999

Astrophysical Institute Potsdam, Potsdam, Germany

1-week stay

June 21 – 27, 1998

The EC Summer School in Astrophysical Discs, Isaac Newton Institute of Mathematical Sciences, University of Cambridge, UK

Talks:

February 12, 2019

Fraunhofer Institute for Integrated Circuits IIS, Erlangen, Germany: *Gamut-Driven Processing of Face Images*

April 30, 2016

Science and Technology Convergence Forum, Institute for Informatics and Automation Problems of National Academy of Sciences RA, Yerevan: *Color-based Iterative Processing of Face Images*

April 23, 2009

College of Engineering Seminar, AUA, Yerevan: *Color Based Iterative Face Detection* (by S. Khachatryan and A. Gaspar)

March 26, 2009

College of Engineering Seminar, AUA: *Short Introduction to Mobile Computing and Presentation of Implemented Mobile Applications* (by S. Khachatryan, A. Hayrapetyan, A. Kazhoyan, A. Petrosyan, S. Sargsyan and A. Sergeyan)

July 9, 2004

College of Engineering Seminar, AUA: *Introduction to Quantum Computers*

October 14, 1999

Astrophysical Institute Potsdam Seminar, Germany: *Nonlinear Perturbations in Gravitating Discs and the Spiral Structure of Galaxies*

Scientific Publications:

1. M. G. Abrahamian, S. G. Khachatryan. Strictly nonlinear waves in an embedded rotating gaseous disk. *Astrophysics* **40**, 190-197, 1997.
2. M. G. Abrahamian, S. G. Khachatryan. Strongly Non-Linear Waves in Rotating Gaseous Disc and Origin of Non-Linear Phenomena in Central Disc of Galaxy. In *Structure and Evolution of Stellar Systems*, ed. T. A. Agekian et al, St.-Petersburg, 388, 1997.
3. M. G. Abrahamian, S. G. Khachatryan. Nonlinear Waves in Rotating Viscous Gaseous Disc. In *Proc. of Int. Conf. on Dynamics of Gravitating Systems*, Uman, Ukraine, May 19-21, 20, 1998.
4. Abramyan, M.G., Khachatryan, S.G. Nonlinear perturbations of a gravitating gaseous disk at the limit of gravitational instability and the spiral structure of galaxies. *Astrophysics* **42**, 306–315, 1999.

5. M. G. Abrahamian, S. G. Khachatryan. Propagation of Non Linear Waves Caused by Explosion in the Rotating Gaseous Disc of the Galaxy. In *Proc. of IAU Symp. N194 (BAO, 1998)*, 1999.
6. Abrahamian, M.G., Khachatryan, S.G. Propagation of an explosive pulse in an embedded, rotating, light gaseous disk. *Astrophysics* **43**, 45–54, 2000.
7. Abrahamian, M.G., Khachatryan, S.G. Illustration of a nonlinear wave model of the spiral structure of galaxies with different types of rotation curves. *Astrophysics* **43**, 156–161, 2000.
8. S. Khachatryan. Modification of the Method of Integration along Characteristics as Adaptive Mesh Approach in Solution of Hyperbolic and Parabolic PDEs. *WSEAS Transactions on Mathematics*, 4 (1), 24-27, 2005.
9. S. Khachatryan. Propagation of 2D Nonlinear Density Waves on an Adaptive Mesh. In *Recent Advances in Continuum Mechanics – Proc. of the 4th IASME / WSEAS Int. Conference on Continuum Mechanics*, 62-66, 2009.
10. S. Khachatryan, A. Gaspar. Color Based Iterative Detection of the Face Vertical Axis. In *Advanced Applications of Electrical Engineering – Proc. of the 8th WSEAS Int. Conference on Applications of Electrical Engineering*, 222-227, 2009.
11. S. Khachatryan. FLID Color Based Iterative Face Detection. *Journal of Hybrid Computing Research*, 3 (1), 1-7, 2010.
12. S. Khachatryan. Electrostatic Approach to the Problem of Routing on a Grid. *Journal of Hybrid Computing Research*, 3 (1), 27-35, 2010.
13. S. Khachatryan, A. Petrosyan. Systems of Interacting Particles as Placement Models. In *Proc. of the 4th Int. Conference of Young Scientists on Computer Science and Engineering CSE2010*, Lviv, Ukraine, November 25 – 27, 198-199, 2010.
14. S. Khachatryan, S. Mojtahedi, A. Petrosyan. Interacting Particles Method of Recognition of Software Module Clusters. In *Proc. of the 8th Int. Conference on Computer Science and Information Technologies*, Yerevan, Armenia, 149-152, 2011.
15. S. Khachatryan, S. Sargsyan, A. Hayrapetyan. Interacting Particles Model of Go Game. In *Proc. of the 8th Int. Conference on Computer Science and Information Technologies*, Yerevan, Armenia, 183-185, 2011.
16. S. Khachatryan and K. Grigoryan, A Gate Model of Emotional Learning. *9th Int. Conference on Computer Science and Information Technologies Revised Selected Papers*, Yerevan, 1-8, 2013.
17. S. Khachatryan, A. Zakaryan. Extracting Meanings from Simple Algorithmic Problems. In *Proc. of the 10th Int. Conference on Computer Science and Information Technologies*, Yerevan, Armenia, 2015.
18. S. Khachatryan, N. Salmasyan. Preliminary Particles Model of Unconstrained Examination Timetabling and its Optimization Using Neural Networks. In *Proc. of the 11th Int. Conference on Computer Science and Information Technologies*, Yerevan, Armenia, 84-87, 2017.
19. A. Davtyan, S. Khachatryan. Simultaneous Multi-Start Simulated Annealing for Capacitated Vehicle Routing Problem, *WSEAS Transactions on Computer Research*, 8, 22-25, 2020.
20. V. Stepanyan, S. Khachatryan, S. Hovhannisyan. Thermodynamics of Physical Approximations to NP-complete Problems, *Journal of Contemporary Physics*, 57 (1), 52-58, 2022.

21. S. Khachatryan, S. Hovhannisyan, V. Stepanyan. Quantum Classification of Even and Odd Functions and Quantum State Discrimination, *International Journal of Modern Physics C*, to be revised and resubmitted, 2023.
22. S. Khachatryan, Z. Garapetian. Direct Simulation of Spiral Structure in Gravitating Gaseous Discs Driven by Nonlinear Density Waves – 1D Model; to be submitted.
23. S. Khachatryan, Z. Garapetian. A Method of Integration of Hyperbolic PDEs along Characteristics with Mesh Recovery; in progress.
24. S. Khachatryan. Direct Simulation of Spiral Structure in Gravitating Gaseous Discs Driven by Nonlinear Density Waves – 2D Model; in progress.
25. S. Khachatryan, R. Ashughyan, L. Stepanyan. Scrum Model of Programming Contests; in progress.
26. S. Khachatryan, S. Hovhannisyan, V. Stepanyan. Swap Test-based State Discrimination in Quantum Classification of Even and Odd Functions, in progress.

Educational Publications:

1. S. Khachatryan, M. Minassian. Microsoft Excel Discovery + CD; Areg Publishing House, Yerevan, ISBN 99930-56-37-5, 2003.
2. S. Khachatryan, M. Minassian. Microsoft Word Essentials + CD; Areg Publishing House, Yerevan, ISBN 99930-56-32-4, 2004.
3. L. Hovanessian, A. Asadoorian, S. Khachatryan. Object-Oriented Management Platform for a KNX-based Home Automation System. In *Proc. of the 4th Int. Conference of Young Scientists on Computer Science and Engineering CSE2010*, Lviv, Ukraine, 38-39, 2010.
4. S. Khachatryan. From Logc Puzzles to Logic Gates – Combining Fun and Practice in Teaching Introduction to Computer Science; In *Proc. of the 5th Int. Conference on New Perspectives in Science Education*, Florence, Italy, 154-158, 2016.
5. S. Khachatryan. Finite Automata Conquer Leap Years; to be submitted.
6. S. Khachatryan. Parasitic Numbers as a Comprehensive Case-study in Theory of Computing; to be submitted.
7. S. Khachatryan, L. Sargsyan. Object-Oriented Dances. Part 1: All Basic Concepts in One Comprehensive Case-study; to be submitted.
8. S. Khachatryan, L. Sargsyan. Object-Oriented Dances. Part 2: Classes, Objects, Pointers; to be submitted.

Selected projects not reflected in other sections:

2022, AUA

Supervisor of BS Capstone: *Using Handwriting Features to Predict Student Performance in IT and Engineering Domain* (Python / Random Forest Classifier)

2021, AUA

Supervisor of BS Capstone: *Drinking Bird Engine: Simulation and Discussion* (Java / Thermomechanical modeling)

2020, AUA

Supervisor of BS Capstone: *Pulsar Detection – the Effect of Interstellar Medium on Predictions and the Bias-Variance Tradeoff* (Python / Random Forest Classifier)

2005 – 2018, AUA

Coach of AUA IT teams – participation in local and international programming contests, including:

- **ACM ICPC Northeastern Europe Regional Contest**: 3rd degree diploma – 2016, 2017
- **Open Southern Caucasus Championship**: 2nd degree diploma – 2014 (2), 2015, 2016, 2017; 3rd degree diploma – 2011 (2)
- **Microsoft Imagine Cup**: 1st place in the National Contest and qualification for the Imagine Cup World Finals – 2009
- **Armenian Independence Cup**: 3rd place – 2015, 2017
- **Robotic Atmospheric Data Acquisition International Competition** by Yerevan Physics Institute – 2015

2016 – 2017, Engineering Research Center (ERC) of AUA and Mentor Graphics

Algorithm Developer: *Interpolation of RLC-circuit underdamped responses*

2016 – 2017, AUA

Supervisor of Software Engineering Term Projects: *Relativistic Space-Time App RUNinREST* (Android)

2009, AUA

Supervisor of Master's Theses:

- *GPU Applications* – a Go Player (CUDA)
- *Field-based Model of Go Game* (2 concurrent projects, C#)

2006 – 2008, ERC, AUA

Supervisor of a local outsourcing team within CSLI project, Stanford University, USA – *Redesign of Turing's World 3.0 Simulator* (Java)

2007, AUA

Supervisor of Master's Thesis in Industrial Engineering and Systems Management: *Analysis of Wastepaper Recycling based on American University of Armenia Case-Study*

2005, AUA

Supervisor of Master's Theses: *Implementation of Parallel Computing in AUA and Parallelization of some Numeric Methods and Quantum Algorithms* (3 concurrent projects, C / MPIch)

2004, AUA

Supervisor of Master's Thesis: *Object-Oriented Design of a Multi-Method Solver of Partial Differential Equations* (C++)

1995 – 1997, ERC, AUA

Researcher, **NSF Project No CMS-504541**: *LRFD design of models describing lift slab structures and investigation of their stability* (Drain3dx)

1993, YSU and YerPhI

4th Year Undergraduate Course Project: *Simulation of astronomical optical devices*

1992, YSU and YerPhI

3rd Year Undergraduate Course Project: *Calculation of energy loss by hadrons in cosmic rays*

Computing skills: C/C++, Java, Matlab, Python, MPI / MPIch, CUDA, Mathematica, VB/VBA, Agile Software Development, Scrum

Service on Committees:

2014 – 2016
Undergraduate Admissions Committee, AUA

2013 – 2014
Curriculum Committee, AUA

2005 – 2013
University-wide Admissions Committee, AUA

2004 – 2007
Faculty Senate, AUA