CURRICULUM VITAE

Ochbadrakh CHULUUNBAATAR

Personal Information:

Date of Birth: 24 July 1974

Place of Birth: Ulaanbaatar, Mongolia

Education:

1992 – 1996 Faculty of Mathematics, National University of Mongolia.

Academic degrees:

1998 Master of Science in Numerical Mathematics: *"Some mathematical questions of the few-body problem in quantum mechanics"*, Supervisor: Prof. Kh. Tsookhuu, National University of Mongolia.

2002 Candidate of Sciences in Physics and Mathematics: *"The Newton variation-iteration schemes for numerical study of the three-body quantum systems"*, Supervisors: Profs. I.V. Puzynin and S.I. Vinitsky, JINR.

2010 Doctor of Sciences in Physics and Mathematics: *"The variation-projective methods for investigation of few-body quantum systems"*, Scientific advisers: Profs. I.V. Pusynin and S.I. Vinitsky, JINR.

Specialization:

Mathematical Modelling, Numerical Methods and Program Complexes.

Professional Career:

1997 – 1999 Lecturer of the Department of Applied Mathematics, SMCS NUM.

1999 – 2006 Junior Scientist, LCTA/LIT JINR.

2006 – 2010 Senior Scientist, LIT JINR.

2010 – 2011 Leading Scientist, LIT JINR.

Since 2011 Head of Division for Calculations of Complex Physical Systems, LIT JINR.

Scientific-Organizational Activities:

Since 2007 Head of National Group of Mongolia in JINR.

Since 2012 Member of the Scientific-Technical Council of LIT JINR.

Bibliography:

Results of the scientific activities have been published in more than 180 articles.

Awards, Prizes:

2011 Medal for 90th Anniversary of Mongolian People's Revolution.

2011 Certificate of Honor of the Governor of Dubna, Russian Federation.

2012 Honorary worker of Science of Mongolia.

2012 Laureate of the State Prize of Mongolia.

2016 Letter of Thanks of the Governor of Moscow region, Russian Federation.

Present Position:

Laboratory of Information Technologies, Joint Institute for Nuclear Research, Dubna, Moscow Region 141980, Russia

Permanent Position:

Institute of Mathematics, National University of Mongolia, Ulaanbaatar, Mongolia

Scientific Interests:

Computational physics, mathematical modelling, variational and numerical methods in the few-body problem. High accuracy uncoupled correlated calculations of energy of helium isoelectronic bound states. Impact ionization of helium by fast electron or proton in Born's approximation. A multi-channel scattering problem and exact solvable models: Schwinger iteration-variational method, Kantorovich method of reducing a boundary problem to the coupled ordinary differential equations, Monte-Carlo methods, etc.

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LIST OF MAIN PUBLICATIONS BY O. CHULUUNBAATAR
(2013-2018)

1. **O. Chuluunbaatar**, S.I. Vinitsky, A.A. Gusev, V.L. Derbov, and P.M. Krassovitskiy, *Solution of quantum mechanical problems using finite element method and parametric basis functions*, Bulletin of the Russian Academy of Sciences **82**, pp. 654–660 (2018).

2. **O. Chuluunbaatar**, S.I. Vinitsky, A.A. Gusev, V.L. Derbov, and P.M. Krassovitskiy, *Quantum transparency of barriers and reflection from wells for clusters of identical particles*, Bulletin of the Russian Academy of Sciences **82**, pp. 648–653 (2018).

3. A. Galstyan, Yu.V. Popov, N. Janssens, F. Mota-Furtado, P.F. O'Mahony, P. Decleva, N. Quadri, **O. Chuluunbaatar**, B. Piraux, *Ionisation of H_2O by a strong ultrashort XUV pulse: a model within the single active electron approximation*, Chemical Physics **55**, pp. 22–30 (2018).

4. A. Gusev, **O. Chuluunbaatar**, S. Vinitsky, V. Derbov, L. Hai, E. Kazaryan, H. Sarkisyan, *Finite element method for calculating spectral and optical characteristics of axially symmetric quantum dots*, Proceedings of SPIE **10717**, pp. 1071712 (2018).

5. A.A. Gusev, **O. Chuluunbaatar**, Yu.V. Popov, S.I. Vinitsky, V.L. Derbov, K.P. Lovetskiy, *One-dimensional "atom" with zero-range potential perturbed by finite sequence of zero-duration laser pulses*, Proceedings of SPIE **10717**, pp. 1071710 (2018).

6. A.A. Gusev, S.I. Vinitsky, **O. Chuluunbaatar**, V.L. Derbov, A. Góźdź and P. M. Krassovitskiy, *Parametric bases for elliptic boundary value problem*, J. Phys. Conf. Ser. **965**, pp. 012016–1–7 (2018).

7. **O. Chuluunbaatar**, K. Kouzakov and Yu. Popov, *Peculiarities of Matrix-Element Calculations with Few Coulomb Functions for Particles' Scattering Processes*, EPJ Web of Conferences **173**, pp. 03007–1–4 (2018).

8. A. Gusev, S. Vinitsky, **O. Chuluunbaatar**, G. Chuluunbaatar, V. Gerdt, V. Derbov, A. Góźdź and P. Krassovitskiy, *Interpolation Hermite Polynomials for Finite Element Method*, EPJ Web of Conferences **173**, pp. 03009–1–4 (2018).

9. A. Gusev, S. Vinitsky, **O. Chuluunbaatar**, G. Chuluunbaatar, V. Gerdt, V. Derbov, A. Góźdź and P. Krassovitskiy, *High-Accuracy Finite Element Method: Benchmark Calculations*, EPJ Web of Conferences **173**, pp. 03010–1–4 (2018).

10. T. Zhanlav, **O. Chuluunbaatar** and V. Ulziibayar, *Generating Function Approach to the Derivation of Higher-Order Iterative Methods for Solving Nonlinear Equations*, EPJ Web of Conferences **173**, pp. 03024–1–4 (2018).

11. **O. Chuluunbaatar**, S.A. Zaytsev, K.A. Kouzakov, A. Galstyan, V.L. Shablov, and Yu.V. Popov, *Fully differential cross sections for singly ionizing 1-Mev p+He collisions at small momentum transfer: Beyond the Frst Born approximation*, Phys. Rev. **A 96**, pp. 042716–1–7 (2017).

12. T. Zhanlav, **O. Chuluunbaatar** and V. Ulziibayar, *Accelerating the convergence of Newton-type iterations*, J. Numer. Anal. Approx. Theory **46**, pp. 162–180 (2017).

13. T. Zhanlav, **O. Chuluunbaatar** and V. Ulziibayar, *Generating function method for constructing new iterations*, Applied Mathematics and Computation **315**, pp. 414–423 (2017).

14. A.A. Gusev, V.P. Gerdt, **O. Chuluunbaatar**, G. Chuluunbaatar, S.I. Vinitsky, V.L. Derbov, A. Góźdź, *Symbolic-numerical algorithms for solving the parametric self-adjoint 2D elliptic boundary-value problem using high-accuracy finite element method*, Lecture Notes in Computer Science **10490**, pp. 151–166 (2017).

15. A.A. Gusev, V.P. Gerdt, **O. Chuluunbaatar**, G. Chuluunbaatar, S.I. Vinitsky, V.L. Derbov, A. Góźdź, *Symbolic-numerical algorithm for generating interpolation multivariate hermite polynomials of high-accuracy finite element method*, Lecture Notes in Computer Science **10490**, pp. 134–150 (2017).

16. Т. Жанлав, В. Улзийбаяр, **О. Чулуунбаатар**, *Необходимые и достаточные условия сходимости двух и трехшаговых итераций Ньютоновского типа*, ЖВМиМФ **57**, сс. 1093–1102 (2017), Computational Mathematics and Mathematical Physics **57**, pp. 1090–1100 (2017).

17. S. Obeid, **O. Chuluunbaatar** and B.B. Joulakian, *(e, 2e) simple ionization of H_3^+ by fast electron impact: use of triangular three-center continuum and bound state wave functions*, J. Phys. **B 50**, pp. 145201–1–9 (2017).

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19. A. Galstyan, Yu.V. Popov, F. Mota-Furtado, P.F. O'Mahony, N. Janssens, S.D. Jenkins, **O. Chuluunbaatar**, and B. Piraux, *Modelling laser-atom interactions in the strong field regime*, Eur. Phys. J. D **71**, pp. 97–1–11 (2017).

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21. А.А. Гусев, **О. Чулуунбаатар**, С.И. Виницкий, А. Гуждж, *Метод конечных элементов решения краевых задач для квантово-механических систем*, Вестник Российско-Армянского университета. Физико-математические и естественные науки **1**, сс. 12–25 (2017).

22. J. Gatzke, F. Navarrete, M. Ciappina, H. Gatzke, **O. Chuluunbaatar**, S.A. Zaytsev, A.A. Bulychev, K.A. Kouzakov, A. Galstyan, M. Waitz, H.-K. Kim, T. Bauer, A. Laucke, S. Eckart, G. Kastirke, J. Müller, M. Ritzer, E. Bloch, M. Richter, K. Fehre1, M. Kunitski, Ch. Müller, J. Voigtsberger, J. Rist, K. Pahl, M. Honig, M. Pitzer, M. Weller, I. Vela Pérez, J. Hoehl, G. Nalin, S. Grundmann, H. Maschkiwitz, C. Janke, S. Zeller, C. Goihl, Y. Herrman, D. Trabert, T. Jahnke, L.Ph.H. Schmidt, Yu.V. Popov, R. Dörner, R.O. Barrachina and M. S. Schöffler, *Single ionization of Helium at 0.5 - 2 MeV proton impact: On the quest for projectile coherence effects*, J. Phys. Conf. Ser. **875**, pp. 092006–1–1 (2017).

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26. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky, L.L. Hai, V.L. Derbov, and P.M. Krassovitskiy, *Model of diatomic homonuclear molecule scattering by atom or barriers*, Communications in Computer and Information Science. **678**, pp. 511–524 (2016).

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29. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky, V.L. Derbov, *Algorithms for solving the boundary-value problems for atomic trimers in collinear configuration using the kantorovich method*, Вестник РУДН: Серия Математика. Информатика. Физика. **4**, pp. 56–76 (2016).

30. A. Galstyan, **O. Chuluunbaatar**, A. Hamido, Yu.V. Popov, F. Mota-Furtado, P.F. O'Mahony, N. Janssens, F. Catoire and B. Piraux, *Erratum: Reformulation of the strong-field approximation for light-matter interactions [Phys. Rev. A 93, 023422 (2016)]*, Phys. Rev. **A 94**, pp. 029901(E)–1–1 (2016).

31. A.A. Gusev, V.P. Gerdt, L.L. Hai, V.L. Derbov, S.I. Vinitsky, **O. Chuluunbaatar**, *Symbolic-numeric algorithms for solving BVPs for a system of ODEs of the second order: multichannel scattering and eigenvalue problems*, Lecture Notes in Computer Science **9890**, pp. 212–227 (2016).

32. Z.N. Ozer, E. Ali, M. Dogan, M. Yavuz, O. Alwan, A. Naja, **O. Chuluunbaatar**, B.B. Joulakian, C.-G. Ning, J. Colgan, and D. Madison, *Comparison of experimental and theoretical triple differential cross sections for the single ionization of CO_2 ($1\pi_g$) by electron impact*, Phys. Rev. **A 93**, pp. 062707–1–6 (2016).

33. H. Gassert, **O. Chuluunbaatar**, M. Waitz, F. Trinter, H.-K. Kim, T. Bauer, A. Laucke, Ch. Müller, J. Voigtsberger, M. Weller, J. Rist, M. Pitzer, S. Zeller, T. Jahnke, L.Ph.H. Schmidt, J. B. Williams, S.A. Zaytsev, A. A. Bulychev, K.A. Kouzakov, H. Schmidt-Böcking, R. Dörner, Yu. V. Popov, and M. S. Schöffler, *Agreement of experiment and theory on the single ionization of helium by fast proton impact*, Phys. Rev. Lett. **116**, pp. 073201–1–6 (2016).

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35. А.А. Гусев, С.И. Виницкий, **О. Чулуунбаатар**, В.Л. Дербов, А. Гуждж, П.М. Красовицкий, *Метастабильные состояния составной системы при туннелировании через отталкивающие барьеры*, Теоретическая математическая физика **186**, сс. 27–50 (2016), Theoretical and Mathematical Physics **186**, 21–40 (2016).

36. S. Vinitsky, A. Gusev, **O. Chuluunbaatar**, V.L. Derbov, A.S. Zotkina, *On calculations of two-electron atoms in spheroidal coordinates mapping on hypersphere*, Proceedings of SPIE **9917**, pp. 99172Z (2016).

37. A.A. Gusev, L.L. Hai, **O. Chuluunbaatar**, S.I. Vinitsky, and V.L. Derbov, *Solution of boundary-value problems usig Kantorovich method*, EPJ Web of Conferences **108**, pp. 02026–1–6 (2016).

38. A.A. Gusev, L.L. Hai, **O. Chuluunbaatar**, V. Ulziibayar, S.I. Vinitsky, V.L. Derbov, A. Góźdź, and V.A. Rostovtsev, *Symbolic-numeric solution of boundary-value problems for the Schrödinger equation using the finite element method: scattering problem and resonance states*, Lecture Notes in Computer Science **9301**, pp. 182–197 (2015).

39. O. Alwan, **O. Chuluunbaatar**, X. Assfeld, B.B. Joulakian, *Theoretical study of $(\gamma, 2e)$ photo-double ionization of CO_2 in the equal energy sharing regime using Dyson orbitals and the parameterized three center continuum wave function*, J. Phys. **B 48**, pp. 185203–1–7 (2015).

40. T. Zhanlav, **O. Chuluunbaatar** and V. Ulziibayar, *Higher-order accurate numerical solution of unsteady Burgers' equation*, Applied Mathematics and Computation **250**, pp. 701–707 (2015).

41. H. Gassert, **O. Chuluunbaatar**, M. Waitz, H.-K. Kim, T. Bauer, A. Laucke, Ch. Müller, J. Voigtsberger, M. Weller, J. Rist, K. Pahl, M. Honig, M. Pitzer, S. Zeller, T. Jahnke, L.Ph.H. Schmidt, S.A. Zaytsev, A.A. Bulychev, H. Schmidt-Böcking, K.A. Kouzakov, R. Dörner, M.S. Schöffler and Yu.V. Popov, *Single ionization of helium by fast proton impact: Searching for projectile coherence*, J. Phys. Conf. Ser. **635**, pp. 022053–1–1 (2015).

42. Yu. V. Popov,, A. Galstyan, **O. Chuluunbaatar**, S. Houamer, A.A. Bulychev, M.S. Schöffler, H.-K. Kim, J.N. Titze, T. Jahnke, L.Ph.H. Schmidt, H. Schmidt-Böcking, R. Dörner, *Charge transfer processes in proton-helium collisions: The validity of the first Born approximation*, J. Phys. Conf. Ser. **601**, pp. 012008–1–8 (2015).

43. T. Zhanlav, **O. Chuluunbaatar** and V. Ulziibayar, *A brief description of two-sided approximation for some Newton's type methods*, Математическое Моделирование **26**, сс. 71–77 (2014).

44. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky, A.G. Abrashkevich, V.L. Derbov, *Numerical solution of elliptic boundary-value problems for Schrödinger-type equations using the Kantorovich method*, Mathematical Modelling and Geometry **2**, pp. 54–80 (2014).

45. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky, A.G. Abrashkevich, *Algorithm for computing a wave packet evolution of the time-dependent Schrödinger equation*, Mathematical Modelling and Geometry **2**, pp. 33–53 (2014).

46. O. Alwan, **O. Chuluunbaatar**, X. Assfeld, A. Naja, B.B. Joulakian, *(e,2e) simple ionization of CO_2 by fast electron impact: use of three-center parameterized continuum wave function and Dyson orbitals*, J. Phys. **B 47**, pp. 225201–1–7 (2014).

47. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky and A.G. Abrashkevich, *KANTBP 3.0: New version of a program for computing energy levels, reflection and transmission matrices, and corresponding wave functions in the coupled-channel adiabatic approach*, Comput. Phys. Commun. **185**, pp. 3341–3343 (2014).

48. S.I. Vinitsky, A.A. Gusev, **O. Chuluunbaatar**, L.L. Hai, V.L. Derbov, P.M. Krassovitskiy, A. Góźdź, *Symbolic numerical algorithm for solving quantum tunneling problem of a diatomic molecule through repulsive barriers*, Lecture Notes in Computer Science **8660**, pp. 472–490 (2014).

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50. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky and A.G. Abrashkevich, *POTHEA: A program for computing eigenvalues and eigenfunctions and their first derivatives with respect to the parameter of the parametric self-adjoined 2D elliptic partial differential equation*, Comput. Phys. Commun. **185**, pp. 2636–2654 (2014).

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54. M.S. Schöffler, H.-K. Kim, **O. Chuluunbaatar**, S. Houamer, A.G. Galstyan, J.N. Titze, T.Jahnke, L.Ph.H. Schmidt, H. Schmidt-Böcking, R. Dörner, Yu.V. Popov and A.A. Bulychev, *Transfer excitation reactions in fast proton-helium collisions*, Phys. Rev. **A 89**, pp. 032707–1–9 (2014).

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56. A.A. Gusev, **O. Chuluunbaatar**, S.I. Vinitsky, A.G. Abrashkevich, *KANTBP 3.0: New version of a program for computing energy levels, reflection and transmission matrices, and corresponding wave functions in the coupled-channel adiabatic approach*, Вестник РУДН: Серия Математика. Информатика. Физика. **2**, pp. 39–46 (2014).

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67. M.S. Schöffler, **O. Chuluunbaatar**, S. Houamer, A.G. Galstyan, J.N. Titze, L.Ph.H. Schmidt, T.Jahnke, H. Schmidt-Böcking, R. Dörner, Yu.V. Popov, A.A. Gusev and C. Dal Cappello, *Two-dimensional electron-momentum distributions for transfer ionization in fast proton-helium collisions*, Phys. Rev. **A 88**, pp. 042710–1–7 (2013).

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69. A. Gusev, S. Vinitsky, **O. Chuluunbaatar**, V.A. Rostovtsev, L.L. Hai, V. Derbov, A. Gozdz and E. Klimov, *Symbolic-numerical algorithm for generating cluster eigenfunctions: identical particles with pair oscillator interactions*, Lecture Notes in Computer Science **8136**, pp. 155–168 (2013).

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