

# ALEKSANDER ZUJEV

## *Curriculum Vitae*

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## EDUCATION

**1980 - 1985 in USSR:** Moscow State University and Dnepropetrovsk State University, Master of Science in Mathematics, with distinction (Cum Laude). Degree title: Mathematician, Teacher of Mathematics.

**2002 - 2003 in USA:** Preparing for graduate school: “Open campus” Quantum Mechanics classes, Completed GRE tests.

**2003 - 2010:** PhD, Physics Department, UC Davis. Condensed matter; supervisor Professor R. T. Scalettar.

## AWARDS

### High School Awards

Winner of Republican (Ukraine) Physics Olympiads, and Winner of All-Union (USSR) Physics Olympiads.  
Winner of Voroshilovgrad Oblast Mathematics Olympiad.

### Work Awards

1980s: Best Young Specialist, Project Institute, Ukraine

## EMPLOYMENT

**1976 - 1988:** Ukraine, Project Institute. Worked concurrently with studying Mathematics at Dnepropetrovsk University. Started as a Computer Operator, and learned Programming.

**1989 - 1994:** Tallinn, Estonia, Volta Fabrique. Programmer.

- Wrote my own version of LISP language.

**1994 - 1998:** Tallinn, Estonia, EVEA bank. Programmer.

- Eveacom project - a system for remote banking for dial-up clients.

**1998 - 1999:** Co-Owner and Programmer of Internet promotional company.

- A program to post advertisements on “Free For All” pages on the Internet. Written originally for Unix, I later made a Windows version.

**1999 - 2001:** Freelance programming.

- An example: Creating a website to help a client sell her home-made soap online.

**2003 - 2010:** Teaching Assistant, University of California, Davis, while a graduate student in Physics.

- Teaching Physics in Mathematically intensive classes, including Statistical Mechanics, Analytical Mechanics, Quantum Mechanics, Computational Physics, Mathematical Methods in Physics, and more.

**2010 - 2013:** Research Fellow, Nanyang Technological University, Singapore.

- Two research projects in Computational Condensed Matter Physics - study of layered lattice models, including properties of magnetism and superconductivity.
- Studying Chaos and Quantum Computing.

**EMPLOYMENT (continued)**

**2013 - present:** Visiting Scholar, University of California, Davis.

- Continuing work on two projects started in Singapore (published).
- Working on a project in Condensed Matter with Dr. Scalettar.
- Working on a project in Chaos Theory “Independent and Coupled Systems”.
- Collaborating with Dr. Campbell in research and writing papers in Mathematics (Number Theory). A few arXiv preprints.
- Studying teaching methods, especially Programmed Learning, or Programmed Instruction system. Developed a technique for using Programmed Learning as an online application.
- Wrote an Internet based application for study of foreign language - a vocabulary-building script. An application for Chinese language is at <http://zujev.physics.ucdavis.edu/Lessons/QUIZ/IIC/quiz.htm>

**TEACHING EXPERIENCE**

**1980 - 1985:** Dnepropetrovsk University. Pedagogical Practice. Teaching Mathematics in adult high school.

**2003 - 2010:** UC Davis, Teaching Assistant in upper division undergraduate and graduate classes in mathematically intensive classes, such as Statistical Mechanics, Analytical Mechanics, Quantum Mechanics,. Computational Physics, Mathematical Methods in Physics, and more.

**2005 - 2010:** Davis, Baciardini’s Martial Arts School, Instructor. Taught Kempo Karate to a variety of adult students using modern teaching styles.

**2000:** Tallinn, Estonia. Experimenting with programmed education. Studied work of B. F. Skinner. Wrote a program for helping to study foreign language - vocabulary building program. Applied for German language.

**COMPUTING EXPERIENCE**

- Operating Systems: Unix, Windows.
- Programming languages: C, Fortran, Pascal, Assembler, LISP, Perl, Python.
- 4th generation programming languages: Mathematica, Maple, MATLAB.
- My Computer Programming and Web Design experience allows me to create Web-Based learning tools for out-of-class education. I create my own applications, which can be fine-tuned for the needs of the class, and for the needs of individual students. Please see an example of a Programmed Instruction lesson on Integration by Parts: <http://zujev.physics.ucdavis.edu/Lessons/IPX2/IP1.html> and a Learning script - a script in form of a quiz, which works as a vocabulary-building program, or mathematical knowledge-building program: <http://zujev.physics.ucdavis.edu/Lessons/QUIZ/II/quiz.htm>.

**PUBLICATIONS**

- About one numerical scheme of solution of boundary problems for biharmonic equations, N. V. Polyakov, A. S. Zujev, Depository of VINITI (1985, admitted 1986) (in Russian)
- Monte Carlo simulations of the superfluid phase transition in an extended Feynman-Kikuchi model, A. Zujev and R. T. Scalettar, Phys. Rev. B 76, 174524 (2007)
- Superfluid and Mott-insulator phases of one-dimensional Bose-Fermi mixtures, A. Zujev, A. Baldwin, R. T. Scalettar, V. G. Rousseau, P. J. Denteneer, and M. Rigol, Phys. Rev. A 78, 033619 (2008)
- Isentropic curves at magnetic phase transitions, J. D. Cone, A. Zujev, and R. T. Scalettar, Phys. Rev. B 83, 045108 (2011)
- Induced magnetism vs. Kondo screening in alternating Mott-metal layers, Aleksander Zujev and Pinaki Sengupta, Phys. Rev. B 88, 094415 (2013)
- Pairing Correlations in the two-layer attractive Hubbard Model, Aleksander Zujev, Richard T. Scalettar, George G. Batrouni, Pinaki Sengupta, New Journal of Physics 16 (2014) 013004

## PUBLICATIONS (continued)

- The series that Ramanujan misunderstood, Geoffrey B. Campbell and Aleksander Zujev, preprint arXiv:1610.03693 (2016)
- On integer solutions to  $x^5 - (x+1)^5 - (x+2)^5 + (x+3)^5 = 5^m + 5^n$ , Geoffrey B. Campbell and Aleksander Zujev, preprint arXiv:1603.00080 (2016)
- A diophantine sum with factorials, Geoffrey B. Campbell and Aleksander Zujev, preprint arXiv:1510.03056 (2015)
- Variations on Ramanujan's nested radicals, Geoffrey B. Campbell and Aleksander Zujev, preprint arXiv:1511.06865 (2015)
- Gaussian integer solutions for the fifth power taxicab number problem, Geoffrey B. Campbell and Aleksander Zujev, preprint arXiv:1511.07424 (2015)

## CONFERENCES / WORKSHOPS

- Oct 2005:** California Section APS Meeting. Talk: Superfluidity and Feynman-Kikuchi Model in 2-D
- Feb 2009:** DARPA "Optical Lattice Emulator" Collaboration Meeting, UC Berkeley.
- Mar 2009:** APS Meeting, Pittsburgh. Talk: t-J Model: DQMC with Infinite U Approach
- Jun 2009:** Electronic Structure ES09 Workshop, UC Davis.
- Mar 2010:** APS Meeting, Portland. Talk: Mean Field Theory Calculation of Isentropic Curves of the Fermion Hubbard Model
- Mar 2012:** APS Meeting, Boston. Talk: Pairing Correlations in the two-layer attractive Hubbard Model

## JOURNAL CLUB PRESENTATIONS AND GROUP TALKS

- Jan 2005:** What is Quantum Monte Carlo?
- Dec 2005:** Lanczos algorithm: Hard-core bosons in 1-D
- Feb 2006:** Thermodynamics of an incommensurate quantum crystal
- May 2006:** Finite size scaling: How-to Introduction using Ising model
- Feb 2007:** Introduction to Spin Hall Effect
- May 2007:** Quantum Computing with Optical Lattices
- Dec 2007:** Introduction to Luttinger Liquid
- Feb 2008:** De Haas-van Alphen Effect
- Aug 2008:** Infinite U Hubbard Model
- Nov 2008:** Fractional Quantum Hall Effect and Quantum Computer
- Mar 2009:** Hole Superconductivity Theory (Controversial theory by J. E. Hirsch)
- May 2009:** Quantum Teleportation
- Nov 2009:** Quantum Cryptography
- Jun 2014:** Independent and Coupled Systems

**FINAL PROJECTS**

**Fall 2004:** Introduction to General Relativity: Closed Timelike Curves

**Winter 2005:** Condensed Matter Physics B: Superfluidity and Feynman-Kikuchi Model

**Winter 2007:** Advanced Electronic Structure: Constructing Pseudopotentials

**Spring 2009:** Large Scale Scientific Computing: CS (cosine-sine) Decomposition

**LANGUAGES**

- English
- Russian - native or bilingual
- German, Polish, Estonian - limited proficiency
- Currently studying Spanish

**SPORT**

- Kempo Karate - 2nd Degree Black Belt
- Taekwondo - 1st Dan.
- Cycling