

# Dr. Tigran Kalaydzhyan

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<http://www.atomicdevelopers.com> | <http://www.abilenerentalhomes.com> | <http://www.tigran.space>

## PROFESSIONAL EXPERIENCE

### **Business Owner, Atomic Developers, Abilene, TX.**

**Jan. 2021 – now**

Analytical and numerical calculations and programming for science, finance and business clients.

### **Business Owner, Abilene Rental Homes, Abilene, TX.**

**Feb. 2020 – now**

Real estate acquisition, improvement, and development. Created a portfolio of 15 rental units in Texas and Indiana (single- and multi-family). Using market mispricing and renovations to generate equity. We currently make 20%+ cash-on-cash ROI, and around 100% total return per year. Raising capital through promissory notes, equity, conventional and commercial loans. Creating and turning around rental companies. RE License #740982.

### **Adjunct Physics Professor at Abilene Christian University and Cisco College.**

**Sep. 2020 – now**

### **Quantitative Analyst at A.R.T. Advisors LLC, New York.**

**Jan. 2019 – Apr. 2020**

Created and implemented new mid- and low-frequency statistical arbitrage strategies for a \$5B stock portfolio (including idea generation, research, data acquisition, backtesting, and writing production code for live trading), achieving Sharpe 2 marginal P&L. Responsible for maintaining and improving 30% of the fund's preexisting forecasts in production. Developed various parts of trading and simulation infrastructure. Experience with traditional datasets (e.g., Reuters Fundamentals, Factset) and alternative data.

### **Research Associate at NASA-JPL, California Institute of Technology.**

**Oct. 2016 – Oct. 2018**

Developed simulation software for NASA fundamental physics programs on board the International Space Station. Played the role of consultant and lead theorist for various space missions. Performed data analysis for the ACES atomic clock mission, tests of gravity and dark matter searches; (b) Simulation of atomic clouds and BEC in a magnetic trap created in the NASA Cold Atom Laboratory (currently in space).

### **Research Associate in Theoretical Nuclear Physics, University of Illinois at Chicago.**

**Sep. 2015 – Oct. 2016**

### **Research Associate in Theoretical Nuclear Physics, Stony Brook University.**

**Sep. 2013 – Aug. 2015**

Developed a set of theoretical hydrodynamic methods predicting properties of quark-gluon plasma in heavy-ion collisions, cosmic rays and the early universe. Multiple awards granted on the basis of extraordinary ability in the field. Selected contributions include: (a) Discovery of hydrodynamic properties of high-multiplicity collision states of two protons at LHC. Monte-Carlo protein-folding codes, and molecular dynamics codes for solving many-body problems; (b) Exact solutions of hydrodynamic equations in presence of electromagnetic fields, rotation and quantum anomalies (in- and out-of-equilibrium).

### **Research fellow in DESY-Hamburg, Germany and ITEP Lattice Group, Russia.**

**May 2010 – Aug. 2013**

Developed a set of theoretical methods, connecting dynamics of classical fields and strings in high-dimensional curved spaces with real-life properties of quark matter in accelerator experiments. Wrote numerical solvers for time-dependent nonlinear ODEs and PDEs (general relativity, supergravity and string theory). Wrote a high-performance Monte-Carlo package for lattice QCD. The code predicted electromagnetic and topological properties of quark matter at high temperatures and in strong magnetic fields.

## EDUCATION

- 2020 Texas Real Estate Agent, License #740982.
- 2017 Coursera.org certificate in Deep Learning, License #HAW4JL726QV9
- 2010 – 2013 Ph.D. studies at the University of Hamburg, Germany. Degree of Doctor of Natural Sciences, with honors. Thesis: "Quark-gluon plasma in strong magnetic fields".
- 2004 – 2010 Lomonosov Moscow State University. Diploma in **Theoretical Physics**, with honors. (GPA: 4.0/4.0, Summa cum laude) Department of Physics. Chair of Quantum Statistics and Field Theory. Thesis: "Black hole creation in three-dimensional anti-de Sitter space".

## TECHNICAL SKILLS

Analysis of experimental and simulated data. Statistical and spectral methods. Extensive knowledge of Python, C, C++ (98, 11, 14), Mathematica. Additional knowledge of Perl, Matlab, Maple, Fortran, x86/ARM assembly. Object-oriented software design, low latency programming, version control (git), system programming, databases (SQL), static and dynamic testing. AWS: EC2, S3, Route 53. Leading researcher with 34 papers in top journals, 750+ citations, 100+ talks. Currently teaching Mathematical Physics part-time as an adjunct professor at Abilene Christian University.

## LANGUAGES

English (fluent), Russian (native), German (fluent), French (intermediate), Armenian (basic).

## RESEARCH PUBLICATIONS

- **T. Kalaydzhyan**, N. Yu, "Searching for stochastic background of ultra-light fields with atomic sensors", Universe 2018, 4(10), 99.
- **T. Kalaydzhyan**, N. Yu, "Extracting dark matter signatures from atomic clock stability measurements", Phys. Rev. D 96 (2017) 075007.
- **T. Kalaydzhyan**, E. Murchikova, "Thermal chiral vortical and magnetic waves: new excitation modes in chiral fluids", Nucl. Phys. B 919 (2017) 173.
- **T. Kalaydzhyan**, "Comment on Testing Planck-scale gravity with accelerators", Phys. Rev. Lett. 116, 209001 (2016).
- **T. Kalaydzhyan**, "Gravitational mass of positron from LEP synchrotron losses", Sci. Rep. 6, 30461 (2016) [Nature Publishing Group].
- **T. Kalaydzhyan**, "Gravitational mass of relativistic matter and antimatter", Phys. Lett. B 751 (2015) 29.
- **T. Kalaydzhyan**, "Testing general relativity on accelerators", Phys. Lett. B 750 (2015) 112.
- **T. Kalaydzhyan**, E. Shuryak, "Collective flow in high-multiplicity proton-proton collisions", Phys. Rev. C 91 (2015) 054913.
- **T. Kalaydzhyan**, E. Shuryak, "Gravity waves generated by sounds from Big Bang phase transitions", Phys. Rev. D 91 (2015) 083502.
- **T. Kalaydzhyan**, E. Shuryak, "Explosive regime should dominate collisions of ultra-high energy cosmic rays", arXiv:1407.3270 [hep-ph].
- **T. Kalaydzhyan**, E. Shuryak, "Collective interaction of QCD strings and early stages of high multiplicity pA collisions", Phys. Rev. C 90 (2014) 014901.
- **T. Kalaydzhyan**, "On the temperature dependence of the chiral vortical effects", Phys. Rev. D 89 (2014) 105012

- **T. Kalaydzhyan**, E. Shuryak, “*Self-interacting QCD strings and string balls*”, Phys. Rev. D 90 (2014) 025031.
- M. N. Chernodub, **T. Kalaydzhyan**, J. Van Doorselaere, H. Verschelde, “*Fermion zero modes in a chromomagnetic vortex lattice*”, Phys. Rev. D 89 (2014) 065021
- Id. Ben-Dayana, **T. Kalaydzhyan**, “*Constraining the primordial power spectrum from SNIa lensing dispersion*”, Phys. Rev. D 90 (2014) 083509.
- M.N. Chernodub, **T. Kalaydzhyan**, J. Van Doorselaere, H. Verschelde, “*On chromoelectric (super)conductivity of the Yang-Mills vacuum*”, Phys. Lett. B 730 (2014) 63
- **T. Kalaydzhyan**, “*Chiral superfluidity of the quark-gluon plasma*”, Nucl. Phys. A 913 (2013) 243.
- Il. Gahramanov, **T. Kalaydzhyan**, I. Kirsch, “*Anisotropic hydrodynamics, holography and the chiral magnetic effect*”, Phys. Rev. D 85, 126013 (2012).
- P. V. Buividovich, **T. Kalaydzhyan**, M. I. Polikarpov, “*Fractal dimension of the topological charge density distribution in SU(2) lattice gluodynamics*”, Phys. Rev. D 86, 074511 (2012).
- **T. Kalaydzhyan**, I. Kirsch, “*Fluid-gravity model for the chiral magnetic effect*”, Phys. Rev. Lett. 106, 211601 (2011).
- V. Braguta, P. Buividovich, **T. Kalaydzhyan**, S. Kuznetsov, M. Polikarpov, “*The Chiral Magnetic Effect and chiral symmetry breaking in SU(3) quenched lattice gauge theory*”, Phys. Atom. Nucl. 75, 488.
- N. Evans, **T. Kalaydzhyan**, K. -y. Kim, I. Kirsch, “*Non-equilibrium physics at a holographic chiral phase transition*”, JHEP 1101, 050 (2011).
- **T. Kalaydzhyan**, I. Kirsch, “*Holographic dual of a boost-invariant plasma with chemical potential*”, JHEP 1102, 053 (2011).
- P. V. Buividovich, M. N. Chernodub, D. E. Kharzeev, **T. Kalaydzhyan**, E. V. Luschevskaya, M. I. Polikarpov, “*Magnetic-Field-Induced insulator-conductor transition in SU(2) quenched lattice gauge theory*”, Phys. Rev. Lett. 105, 132001 (2010).
- **T. Kalaydzhyan**, “*Testing gravity on accelerators*”, Proceedings of CPT'16, Bloomington, Indiana, USA.
- **T. Kalaydzhyan**, “*Testing general relativity on accelerators*”, Proceedings of KSM2015 conference, Frankfurt, Germany.
- **T. Kalaydzhyan**, “*Chiral Superfluidity for QCD*”, Proceedings of QUARKS-2014 conference, Suzdal, Russia.
- **T. Kalaydzhyan**, E. Shuryak, “*Why is the radial flow in central pA collisions stronger than in AA?*”, Nucl. Phys. A 931 (2014) 899.
- **T. Kalaydzhyan**, “*Chiral Superfluidity for the Heavy Ion Collisions*”, PoS CONFINEMENT X, 302 (2013).
- **T. Kalaydzhyan**, I. Kirsch, “*Chiral magnetic effect and holography*”, PoS CONFINEMENT X, 262 (2013).
- V. Braguta, P. Buividovich, **T. Kalaydzhyan**, M.I. Polikarpov, “*Topological and magnetic properties of the QCD vacuum probed by overlap fermions*”, PoS CONFINEMENT X, 085 (2013).
- P. V. Buividovich, M. N. Chernodub, **T. Kalaydzhyan**, D. E. Kharzeev, E. V. Luschevskaya, M. I. Polikarpov, “*Magnetic-field-induced insulator-conductor transition in quenched lattice gauge theory*”, PoS LATTICE2010, 076 (2010).
- V. V. Braguta, P. V. Buividovich, **T. Kalaydzhyan**, S. V. Kuznetsov, M. I. Polikarpov, “*The Chiral Magnetic Effect and chiral symmetry breaking in SU(3) quenched lattice gauge theory*”, PoS LATTICE2010, 190 (2010).
- M. I. Polikarpov et al., “*Conductivity of SU(2) gluodynamics vacuum induced by magnetic field*”, AIP Conf. Proc. 1343, 630-631 (2011).