Jaehoon Lee

Google Brain
1600 Amphitheater Parkway
Mountain View, CA, 94043

Phone: (650) 804-2443
Email: eejaehoon@gmail.com
Homepage: http://jaehlee.github.io

Education

Massachusetts Institute of Technology   Cambridge, MA
    Ph. D. in Theoretical Physics, 2015.
    Thesis: "Studies of superconformal field theories using GLSM and conformal bootstrap"

Seoul National University   Seoul, South Korea
    B.Sc., Physics and Mathematics, 2009.

Harvard University   Cambridge, MA
    Visiting Undergraduate Student, 2008.

Experience

Google Brain   Mountain View, CA
    Google AI Resident, July 2017 -
    Research on infinitely wide neural networks and batch size effects on training deep neural networks

University of British Columbia   Vancouver, Canada
    Postdoctoral Fellow in string theory group, September 2015 - June 2017

CERN, European Organization for Nuclear Research   Geneva, Switzerland
    Summer Student Program, Summer 2008

Research Interests

Machine Learning and Artificial Intelligence

    Interplay between physics and machine learning

    Theoretical aspects of deep neural networks

Theoretical Physics

    Non-perturbative methods for studying strongly interacting quantum field theories

    Entanglement structures in conformal field theories with/without holographic duals

List of Publications

[Google Scholar (https://goo.gl/akC77m). $*$ denotes equal contribution.]

Measuring the Effects of Data Parallelism on Neural Network Training, with Christopher J. Shallue*, Joe Antognini, Jascha Sohl-Dickstein, Roy Frostig, George E. Dahl, arXiv:1811.03600

Gaussian Process Predictions from Gradient Descent Training of Wide Neural Networks, with Lechao Xiao*, Jascha Sohl-Dickstein, Jeffrey Pennington, BayLearn 2018, NeurIPS Bayesian Deep Learning Workshop 2018

Bayesian Convolutional Neural Networks with Many Channels are Gaussian Processes, with Roman Novak, Lechao Xiao*, Yasaman Bahri*, Jeffrey Pennington, Jascha Sohl-Dickstein, Accepted to ICLR 2019, arXiv:1810.05148

Deep Neural Networks as Gaussian Processes, with Yasaman Bahri*, Sam Schoenholz, Roman Novak, Jeffrey Pennington, Jascha Sohl-Dickstein, ICLR 2018, arXiv:1711.00165

Deep Neural Networks and Deep Gaussian Process, with Yasaman Bahri*, Sam Schoenholz, Roman Novak, Jeffrey Pennington, Jascha Sohl-Dickstein, BayLearn 2017 (Best poster)

3d $\mathcal{N} = 2$ minimal SCFTs from Wrapped M5-branes, with Jin-Beom Bae*, Dongmin Gang*, JHEP 1708 (2017) 118

Entanglement entropy from one-point functions in holographic states, with Matt Beach*, Charles Rabideau*, Mark van Raamsdonk* JHEP 1606 (2016) 085

Studies of superconformal field theories using GLSM and conformal bootstrap (Ph.D Thesis), Massachusetts Institute of Technology, 2015

Exact Correlators of BPS Operators From the 3D Superconformal Bootstrap, with Shai Chester*, Silviu Pufu* and Ran Yacoby* JHEP 1503 (2015) 130

The $\mathcal{N} = 8$ Superconformal Bootstrap in Three Dimensions, with Shai Chester*, Silviu Pufu* and Ran Yacoby* JHEP 1409 (2014) 143

Glassy Slowdown and Replica-Symmetry-Breaking Instantons, with Allan Adams*, Tarek Anous* and Sho Yaida* Phys. Rev. E 91, 032148 (2015)

Linking Dynamical Heterogeneity to Static Amorphous Order, with Patrick Charbonneau*, Ethan Dyer* and Sho Yaida* J. Stat. Mech. (2016) 074004

Algebra of Majorana Doubling, with Frank Wilczek*, Phys. Rev. Lett. 111, 226402 (2013)

GLSMs for non-Kähler Geometries, with Allan Adams* and Ethan Dyer*, JHEP 01 (2013) 044

Scholarship and Awards

Simons bootstrap collaboration, postdoctoral fellowship (offered and declined)	2017
Samsung scholarship for graduate studies, $250K for 5 years	2009-2014
Republic of Korea presidential science scholarship for undergraduate studies $40K for 4 years	2003-2009
Scholarship for distinguished undergraduates, Korea foundation for advanced studies	2007-2009
Korea national collegiate math competition, bronze prize	2007

Talks

2019 Feb HEP-AI Journal club, *Understanding Wide Neural Networks*

2018 Dec NIPS Workshop on Bayesian Deep Learning 2018, Poster, *Gaussian Predictions from Gradient Descent Training of Wide Neural Networks*

2018 Dec Google Brain Research Seminar, *Everything you wanted to know about batch size but were afraid to ask*

2018 Oct BayLearn 2018, Poster, *Gaussian Process Predictions from Gradient Descent Training of Wide Neural Networks*

2018 Mar Google Brain Research Seminar, *Deep Neural Networks as Gaussian Processes*

2017 Dec NIPS Workshop on Bayesian Deep Learning 2017, Poster, *Deep Neural Networks as Gaussian Processes*

2017 Oct BayLearn 2017, Poster (best poster), *Deep Neural Networks and Deep Gaussian Process*

2017 Aug HEP-AI Journal club,*K-FAC*

2016 Jul - 2017 June Organizer of Vancouver Deep Learning Study Group

2016 Nov UBC String group meeting, *3d $\mathcal{N} = 2$ minimal SCFTs from Wrapped M5-branes*

2015 Oct UBC String group meeting, *Overview of conformal bootstrap*

2014 Sep MIT String Club, *3D CFTs and $\mathcal{N} = 8$ superconformal bootstrap*

2014 Apr MIT CTP Graduate Student Lunch Club, *Old but new method for studying CFTs*

2014 Apr MIT String Club, *Conformal bootstrap approach*

2014 Mar KIAS, Physics Seminar, Seoul, Korea, *Recent progress in conformal bootstrap*

2014 Mar SNU, CTP Particle Physics Seminar, Seoul, Korea, *Recent progress in conformal bootstrap*

2011 Apr MIT CTP Graduate Student Lunch Club, *How to use gauge theories to study CY geometries*

2011 Spring MIT Fivebranes and Knots Study Group, *Intro to Khovanov homology : Categorification of Jones Polynomial*

2009 Sep - 2010 May Organizer of MIT Center for Theoretical Physics Graduate Student Lunch Club

Academic Activities

2019 Jan Association for the Advancement of Artificial Intelligence 2019   Honolulu, HI
2019 Jan Aspen Winter Conference: Theoretical Physics for Machine Learning   Aspen, CO
2018 Oct Bay Area Machine Learning Symposium (BayLearn) 2018   Menlo Park, CA
2018 Apr International Conference on Learning Representations (ICLR) 2018   Vancouver, Canada
2017 Dec Neural Information Processing Systems (NIPS) 2017   Long Beach, CA
2017 Oct Bay Area Machine Learning Symposium (BayLearn) 2017   Cupertino, CA
2016 Dec Exact Operator Algebras in Superconformal Field Theories   Waterloo, Canada
2016 Dec Neural Information Processing Systems (NIPS) 2016   Barcelona, Spain
2016 Aug Quantum Machine Learning   Waterloo, Canada
2016 Aug CIFAR Deep Learning Summer School   Montreal, Canada
2016 Jul It from Qubit Summer School   Waterloo, Canada
2016 Jun Conformal Field Theories and Renormalization Group Flows in Dimensions $d > 2$ Florence, Italy
2015 Jul Prospects in Theoretical Physics, New Insights Into Quantum Matter   Princeton, NJ
2015 Jun Theoretical Advanced Study Institute in Elementary Particle Physics (TASI)   Boulder, CO
2014 Jul Simons Workshop in Mathematics and Physics   Stony Brook, NY
2014 Jun Strings Conference   Princeton, NJ
2014 Jun Prospects in Theoretical Physics, String Theory   Princeton, NJ
2014 Jan KITP Conference on Quantum Fields beyond Perturbation Theory   Santa Barbara, CA
2013 Mar Spring School on Superstring Theory and Related Topics   Trieste, Italy
2013 Mar *Mathematica* School in Theoretical Physics: Advanced Topics in Conformal Field Theory   Trieste, Italy
2012 Jul Simons Workshop in Mathematics and Physics   Stony Brook, NY
2012 Jun Lecture Series on Mathematical String Theory   Bonn, Germany
2011 Nov New England String Meeting 2011   Providence, RI
2011 Jan Asian Winter School on Strings, Particles and Cosmology   Jeju, Korea
2010 Aug Summer Institute for Theoretical Physics   Pyeongchang, Korea
2010 Apr New England String Meeting 2010   Providence, RI

Services

Reviewer for International Conference on Machine Learning (ICML)   2019
Organizer for Aspen Winter Physics Conference on Theoretical Physics and Machine Learning   2019
Reviewer for International conference on Learning Representations (ICLR)   2019
Reviewer for Neural Information Processing Systems (NIPS)   2018
Reviewer for International Conference on Machine Learning (ICML) workshop on non-convex optimization   2018
Reviewer for International Conference on Machine Learning (ICML)   2018

Teaching

Mastering Quantum Mechanics, 8.05x, Massachussets Institute of Technology (via edX)
    Fall 2014-Summer 2015, Full TA for Professor Barton Zwiebach
Physics I, 8.01, Massachussets Institute of Technology
    Fall 2013, Full TA for Professor Vladan Vuletic
General Relativity, 8.962, Massachussets Institute of Technology
    Spring 2013, Grader for Professor Edward Farhi and Alan Guth
Relativisitic Quantum Field Theory I, 8.323, Massachussets Institute of Technology
    Spring 2012, Grader for Professor Washington Taylor

Independent Coursework

Deep learning nanodegree foundation(Udacity, 2017); Deep Learning(Goodfellow-Bengio-Courville, independent study); Neural Networks for Machine Learning(G.Hinton, UT Coursera, 2016); Learning from Data(CaltechX, 2016); Convolutional Neural Network for Visual Recognition(Stanford CS231n, independent study); Deep Learning(Udacity, 2016); Neural networks and Deep Learning(M.Nielsen's online book, 2016); Intro to Artificial Intelligence(Stanford Udacity, 2016); Machine Learning(Stanford Coursera, 2016); Design and Analysis of Algorithms I(Stanford Coursera, 2015); Artificial Intelligence(BerkeleyX, 2015); Scalable Machine Learning(BerkeleyX, 2015); Intro to Computational Thinking and Data Science(MITX, 2015); Aerial Robotics(UPenn Coursera, 2016); Intro to IoT and Embedded Systems/with Raspberry Pi(UCI Coursera, 2015); Systems Biology(MIT, 2012); Understanding Brain(SNU, 2004)

Skills

Programming: Python, Matlab, Mathematica; Basics of C/C++;

ML Libraries: Tensorflow, Theano, Scikit-learn

Last updated: January 25, 2019