William Huanshan Chuang

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Research Interests

I am interested in mathematical physics, number theory, and moduli spaces of curves. Current projects including: studying solvability of Diophantine equations by using Hasse-Weil zeta function, a translation of the proof of Riemann-Roch theorem for finding the criteria of winning strategy in the language of the chip firing game, arithmetic and topological properties of motivic zeta values, and the role of Hilbert space in Selberg trace formula with constant negative curvature -1 over compact Riemann surfaces.

Education

Department of Mathematics and Statistics, University of San Francisco, Spring 2015 – current.

(Honors) Mathematics, and Computer Science minor, Expected 2018.

Major GPA: **4.0 / 4.0**

Publication: *Revealing a Possible Implication by Imposing Lee-Yang Theorem on the Partition Function of the Universe*.

Research

Current Projects

Research Assistant for Prof. Jeff Hamrick at USF (2016 – current)

Past Projects

Volunteer student programmer for Prof. David Galles (Summer 2016)

Research Assistant for Prof. Cheng-Pang Liu at National Dong Hwa University, Dep of Physics (Spring 2010)

Blue skies *(curiosity-driven, my pet projects)*

Current Projects

Solvability of Diophantine equations, using Hasse-Weil zeta function of elleptic curves over $\mathbb{Q}$

The role of Hilbert space in Selberg trace formula with constant negative curvature -1 over compact Riemann surfaces

Translate the proof of the Riemann-Roch theorem to find the criteria of winning strategy in chip firing game

Arithmetic and topological properties of motivic zeta values

Past Projects

Kontsevich-Soibelman invariant, moduli space of curves (Winter 2016)

Ads/CFT conjecture, Hawking-Page phase transition, and Hilbert-Pólya conjecture (Winter 2016)

A Consistency Verification of Extended Theories of Gravitation (2010)

Introduction to Quantum Gravity in (2+1)-Dimensions (2011)

Derive Atiyah-Singer Index Theorem - by using six distinct approches (2012)

Papers Reading on Ads/CFT (Gauge/Gravity duality) (2012)

Two Approches to Understand Gravitational Lensing (2013)

Kontsevich-Soibelman Wall-Crossing Formula, generalized Donaldson-Thomas Invariants (2013)

Self-Driving Cubes on A Möbius Strip (using C++, started from scratch) (2016)

Teaching

Past Projects

San Francisco Math Circle (Fall 2016)

Teaching Assistant for National Dong Hwa University, Dep of Physics (Fall 2008 – Spring 2010)

Skills

Programming

Languages: R, C/C++, Python, Java, Scheme

Libraries/Software: CUDA, Numpy, TensorFlow, Torch

Database/Toolkit: Spark SQL, MongoDB

Methods

USF Classes: Combinatorics, Introduction to Computer Science (Python and Java), Graduate Algorithms, Automata Theory, Game Engineering, Computer Architecture, C and System Programming, Data Structure, and Algorithms

Transferred NTU(2010–2013), and NDHU(2007–2009) Classes: Calculus I, II, and III, Real Analysis, Linear Algebra, Intro to Formal Methods, Linear Algebra and Probability, Discrete Mathematics, Applied Mathematics I, II, and III, Computational Physics, Thermal Physics, Modern Physics, Quantum Physics I and II, Quantum Mechanics I and II, Classical Mechanics I and II, Electrodynamics I and II, Statistical Mechanics II, Mathematical Physics I, Differential Geometry, Intro to Particle Physics, Dark Energy and Dark Matter, Supersymmetry, Quantum Field Theory II, Advanced Topics in Field Theory

Conferences, Workshops, Seminars and Courses Attended

Summer school on Topological Insulator and Spintronics, 2013

Dynamic Days Asia Pacific (DDAP) 7 — The 7th International Conference on Nonlinear Science, Academia Sinica, August 5, 2012

Summer School on Physics and Mathematics of Symmetry, National Taiwan University, 2012

Towards Ultimate Understanding of the Universe: First LeCosPA Symposium, February 6-9, 2012

Winter School: Anthony Zee's Lectures on Quantum Field Theory, Academia Sinica, Taiwan, 2011

The 2nd APCosPA Winter School/Workshop, National Taiwan University, January 17-28, 2011

The 2nd International Workshop on Dark Matter, Dark Energy Matter, National Tsinghua University, November 5-6, 2010

Summer School on Theoretical Physics, National Tsinghua University, 2009

Seminars and Courses Attended

Srikanth Iyengar (Utah), A local Serre duality for modular representations of finite groups (and group schemes), January 27, 2017, Stanford University

Jeremy Van Horn-Morris (Arkansas), Incorporating genus into the Heegaard Floer differential, January 23, 2017, Stanford University

James Livsey (U.S. Census Bureau), Integer-valued time series: Superposition methods, November 30, 2016, University of San Francisco

William H. Woodall (Virginia Tech), The monitoring and improvement of surgical outcome quality, November 16, 2016, University of San Francisco

Jennifer Chubb, (University of San Francisco), Quantum Algorithms, October 26, 2016, University of San Francisco

Carlo H. Sequin (U.C. Berkeley), Connecting art and mathematics, October 19, 2016, University of San Francisco

Guangliang Chen (San Jose State University), Gaussian SVM: What it is and how to tune its parameters, October 5, 2016, University of San Francisco

Christine Anderson-Cook (Los Alamos National Laboratory), Adding realism when choosing and constructing optimal designs, September 28, 2016, University of San Francisco

Ravi Vakil (Stanford University), The Mathematics of Doodling, September 21, 2016, University of San Francisco

Howard Masur(U. Chicago), GT Seminar: Dehn twists and The Mapping Class Group, September 12, 2016, San Francisco State University

MIT ProfessionalX 6.BDx Honor Code Certificate for Tackling the Challenges of Big Data. Developed by the faculty of the MIT Computer Science and Artificial Intelligence Laboratory in collaboration with MIT Professional Education and edX, March 2015

Mathematical Structure of Quantum Mechanics, National Taiwan University, Fall 2011

Cosmological Physics, National Taiwan University, Fall 2010

Perimeter Institute Recorded Seminar Archive (PIRSA)
Used PIRSA, a permanent, free, searchable, and citable archive of recorded courses and seminars, to take courses offered by Perimeter Institute and University of Waterloo to acquire applied math skills and intuition in: General Relativity, Quantum Field Theory, Ads/CFT, Effective Field Theory, Bosonic String, N=2 Supersymmetric Gauge Theories, and Tensor Network Algorithms

Davide Gaiotto, New Developments in N=2 Supersymmetric Gauge Theories, 2015

Joao Penedones, Scattering in AdS and CFT correlation functions, 2015

Pedro Vieira, Integrability and planar AdS/CFT, 2014

Robert Pfeifer, Introduction to Tensor Network Algorithms, 2014

Senarath de Alwis, Mini-Course: Superstring Cosmology, 2013

Cliff Burgess, Introduction to Effective Field Theory, 2012

Simone Giombi, Mini-Course: Higher Spin Theories, 2011

Achim Kempf, Quantum Field Theory for Cosmology, 2011

Alex Buchel, Introduction to the Bosonic String, 2011

David Tong, Lectures on Quantum Field Theory, 2010

Achim Kempf, General Relativity for Cosmology, 2009

Membership

Association for Computing Machinery, Student Member, April 2015–Current

Association for Computing Machinery, SIGAI Member, April 2016–Current

Class Projects

A Try (self-studied) on Deriving Maxwell Equations by Using Vector Analysis

Pong Game, using C++, and Ogre3D

Linked List Assignment: Playing with Sound (in Java)

Huffman Coding

Persistent Data Structures (BST and Stack)

Dijkstra, Binomial Heaps, Hash Tables, and More!

Volunteer

Past Projects

ACM Special Interest Group on Management of Data SIGMOD, San Francisco (Summer 2016)

Google San Francisco Bay Area CS-First Program, (Summer 2016)

Awards

Awarded 2004 First prize and 2003 Second prize in National Science and Engineering Fair in Taiwan

Last updated: February 12, 2017