William Huanshan Chuang

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Research Interests

I am interested in mathematical physics, number theory, moduli spaces of curves, and Ads/CFT conjecture. Current projects including using Kontsevich-Soibelman Wall-Crossing Formula to study the 2d-4d invariants in moduli space of solutions of Hitchin equations over a compact Riemann surface with gauge group SU(n), and using classical gravity to constrain some results that are derived from Hilbert-Pólya conjecture by computing linear response observables of Hawking-Page phase transition at the classical limit (saddle point), and using supersymmetry.

Education

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

Honor 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)

Volunteer student programmer for Prof. David Galles (2016 – current)

Past Projects

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

Kontsevich-Soibelman invariant, moduli space of curves

Ads/CFT conjecture, Hawking-Page phase transition, and Hilbert-Pólya conjecture

Past Projects

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, and Courses Attended

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

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

Mathematical Structure of Quantum Mechanics, National Taiwan University, Fall 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

Cosmological Physics, National Taiwan University, Fall 2010

Summer School on Theoretical Physics, National Tsinghua University, 2009

Perimeter Institute Recorded Seminar Archive (PIRSA)
Used PIRSA, a massive open online course platform, and is a permanent, free, searchable, and citable archive of recorded seminars from relevant bodies in physics – to take courses offered by Perimeter Institute and University of Waterloo to acquire skills in: General Relativity, Quantum Field Theory, Ads/CFT, Effective Field Theory, Bosonic String, N=2 Supersymmetric Gauge Theories, and Tensor Network Algorithms

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

Scattering in AdS and CFT correlation functions, 2015

Pedro Vieira, Integrability and planar AdS/CFT, 2014

Introduction to Tensor Network Algorithms, Mini-Course on Tensor Network Algorithms - Robert Pfeifer, 2014

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

Quantum Field Theory for Cosmology, 2011

Introduction to the Bosonic String, 2011

David Tong, Lectures on Quantum Field Theory, 2010

General Relativity for Cosmology, 2009

Introduction to Effective Field Theory, 2009

Cosmology Mini Course, 2009

Course 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: January 22, 2017