Yi Jiang

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Personal Blog

Work Experience

Jun 2022 - **AP Math/ Physics Teacher at C2 Education**

Nov 2021 - Apr 2022 **Volunteer at University of California, Riverside**

May 2021 - Jul 2021 **Interim Postdoc at University of California, Riverside**

Education

2013 - 2020 **Ph.D in Physics** (University of California, Riverside)
Advisor: Leonid Pryadko (http://faculty.ucr.edu/∼leonid/)

2010 - 2012 **M.S in Physics** (Arizona State University)

2006 - 2010 **B.S in Physics** (University of Science and Technology of China)

Research

- `gap`: Constructing transitive hyperbolic surface graph with a custom `gap` program, which constructs coset tables of freely presented groups obtained from the infinite von Dyck group.
- C++: On a Linux cluster with *Slurm*: Monte Carlo simulations of Ising Model and Potts Model on graphs with Wolff algorithm and Swendsen–Wang algorithm. Monte Carlo simulations of Random Bond Ising Model (RBIM) and Potts Glass Model on graphs/hypergraphs with heat-bath algorithm.
- Mathematica and C++: Calculating the partition function and spin correlation of RBIM on a planar graph by finding the *Pfaffian* of a matrix which is a product of matrices that feature the differences in the directions of all pairs of adjacent edges, the edges of disordered bonds, and an arbitrary path between the two spins.
- C++: An efficient algorithm to find the number of irreducible sequences of length v, $N_v(q)$, where an irreducible sequence is defined as a sequence of numbers of which any subsequence has a non-zero sum mod q.
- C++: A program that creates a generating matrix for qudit surface code (which is an incidence matrix but the entries are 0, 1 or -1) based on the generating matrix for Ising model (where the entries are 0 or 1) on a surface graph, so that it guarantees the commutation relation (X stabilizers commutes with Z stabilizers, which is trivial in base 2 but needs modification on the generating matrix in base q for general q).
- Misc: LaTeX, gnuplot, etc.

Other skills

I'm good at most areas of mathematics, including calculus, linear algebra, combinatorics and probability, complex numbers, geometry, etc. I find creative ways to apply math concepts to algorithms. Here's an example where I found an $O(n^{1.5})$ time complexity algorithm for a problem that is typically solved in $O(n^2)$ time complexity, with linear algebra and combinatorics.

I also have a sharp eye on mistakes in algorithms. I've put a few examples here.

I learned Python recently and built a Multi-Label Image Classifier using Keras(Tensorflow). I successfully implemented the application locally and remotely on Heroku with Flask.

I'm familiar with HTML, Javascript, CSS. Sometimes I write scripts that works with Greasemonkey/Tampermonkey which modify webpages to make things easier for me. Here's a Javascript puzzle game that I wrote for fun. (The core part is to find the row echelon form of a binary matrix with its row decomposition.)

I also used Matlab, LabVIEW, AutoCAD for some experimental physics research projects before.

I learned Assembly language (MASM) in undergraduate school and I was the first to finish the final exam. I haven't used it since then, but I can pick it back up when needed.

Personal Profile

- I have multiple years of teaching experiences. I'm patient at work and I have a calm personality.
- I love solving mathematical problems. When I was in high school, I attended the math competition (National High School Mathematics League in China) and my score is the 8th highest in the province (it has a population of 15 million). I still challenge myself to solve the mathematical problems that I encounter from time to time.
- Security is always on my mind, all my passwords in the past 10 years are different random strings generated by a script, and I have a encrypted password book to keep them all.
- I read news mostly through a RSS reader, my favorite news source is Slashdot. Well, I'm a nerd and I'm proud of it.

Publications

1. Yi Jiang. *Studies of Statistical-Mechanical Models Related to Quantum Codes*. PhD dissertation, University of California, Riverside, 2020
2. Yi Jiang, Ilya Dumer, Alexey A Kovalev, and Leonid P Pryadko. Duality and free energy analyticity bounds for few-body Ising models with extensive homology rank. *Journal of Mathematical Physics*, 60(8):083302, 2019
3. Yi Jiang and Leonid P Pryadko. Quantum LDPC codes over $\mathbb{Z}_q$: constructions, fault-tolerance, and relation to q-state spin models. (Work in progress)

Academic Events

Mar. 2019	**APS March Meeting, Boston, MA, USA. *Presentation.***
Jan. 2019	**Quantum Information Processing (QIP), Boulder, CO, USA. *Poster presentation.***
Mar. 2016	**APS March Meeting, Baltimore, MD, USA. *Presentation.***

Teaching Experience

General undergraduate physics (lab/discussion/grading) and graduate physics (discussion/grading).

2020 Fall	**Teaching Assistant**	**2017 Winter**	**Teaching Assistant**
2020 Spring	**Teaching Assistant**	**2017 Fall**	**Teaching Assistant**
2019 Fall	**Teaching Assistant**	**2017 Spring**	**Teaching Assistant**
2018 Spring	**Teaching Assistant**	**2016 Winter**	**Teaching Assistant**

2016 Fall	**Teaching Assistant**	**2014 Spring**	**Teaching Assistant**
2015 Fall	**Teaching Assistant**	**2013 Fall**	**Teaching Assistant**
2015 Spring	**Teaching Assistant**	**2011 Fall**	**Teaching Assistant**
2014 Fall	**Teaching Assistant**	**2010 Fall**	**Teaching Assistant**

Honors & Awards

2011	**University Graduate Fellowship**
2009	**Outstanding Student Third Prize Scholarship**
2008	**Outstanding Student Second Prize Scholarship**
2008	**Second prize in 4^{th} Paper Competition of Research-oriented Physics Experiment**
2006	**Outstanding Freshman Third Prize Scholarship**

Other

2008∼2009	**President of Students' Science Fiction Association of USTC**