# Shenghan Jiang

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## Academic History

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| **Caltech**<br>Pasadena, CA | IQIM Postdoctoral Scholar | 09/2017- |
| **Boston College**<br>Chestnut Hill, MA | PhD in Theoretical Physics<br>Advisor: Prof. Ying Ran | 09/2012-06/2017 |
| **Peking University**<br>Beijing, China | B.S., Department of Electronics | 09/2008-07/2012 |

## Research Interest

I am a condensed matter theorist. I am interested in studying quantum mechanical systems with a large number of degrees of freedom and how the constituent degrees of freedom cooperate with each other to realize amazing emergent phenomena. One major direction of my work is to study electronic systems with strong interaction. Surprisingly, strongly correlated electrons in various experimental systems can sometimes (for example, fractional quantum Hall effect) be understood from collective degrees of freedom which are fundamentally different from electronic degrees of freedom. I am also interested in frustrated magnets where such fascinating physics may be realized. My research topics include: topological order in strongly correlated systems; tensor network representation and numerical simulation; exotic quantum phase transitions.

## Related Experience

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| **Ghent University**<br>Ghent, Belgium | Visiting Researcher<br>Host: Prof. Frank Verstraete | 01/2017-03/2017 |
| **University of California Berkeley**<br>Berkeley, CA | Visiting Researcher<br>Host: Prof. Dung-Hai Lee | 08/2016-09/2016 |

## Service

*Reviewer*: Physical Review B, Physical Review Letters

## Publications and Preprints

Shenghan Jiang, Meng Cheng, Yang Qi, Yuan-Ming Lu, Generalized Lieb-Schultz-Mattis theorem on bosonic symmetry protected topological phases, arXiv:1907.08596

Brenden Roberts, Shenghan Jiang, Olexei Motrunich, Deconfined quantum critical point in one dimension, *Phys. Rev. B* **99,** 165143 (2019), arXiv:1904.00010

Shenghan Jiang, Olexei Motrunich, Ising ferromagnet to valence bond solid transition in a one-dimensional spin chain: Analogies to deconfined quantum critical points, *Phys. Rev. B* **99,** 075103 (2019), arXiv:1808.07981

Xu Yang, Shenghan Jiang, Ashvin Vishwanath, Ying Ran, Dyonic Lieb-Schultz-Mattis theorem and symmetry protected topological phases in decorated dimer models, *Phys. Rev. B* **98,** 125120 (2018) (Editors' Suggestions), arXiv:1705.05421

Shenghan Jiang, Ying Ran, Anyon condensation and a generic tensor-network construction for symmetry protected topological phases, *Phys. Rev. B* **95,** 125107 (2017) (Editors' Suggestions), arXiv:1611.07652

Shenghan Jiang, Panjin Kim, Jung Hoon Han, Ying Ran, Competing Spin Liquid Phases in the S=$\frac{1}{2}$ Heisenberg Model on the Kagome Lattice, *SciPost Phys.* **7,** 006 (2019), arXiv:1610.02024

Meng Cheng, Zheng-Cheng Gu, Shenghan Jiang, Yang Qi, Exactly solvable models for symmetry-enriched topological phases, *Phys. Rev. B* **96,** 115107 (2017) (Editors' Suggestions), arXiv:1606.08482

Panjin Kim, Hyunyong Lee, Shenghan Jiang, Brayden Ware, Chao-Ming Jian, Michael Zaletel, Jung Hoon Han, Ying Ran, Featureless quantum insulator on the honeycomb lattice, *Phys. Rev. B* **94,** 064432 (2016), arXiv:1509.04358

Shenghan Jiang and Ying Ran, Symmetric tensor networks and practical simulation algorithms to sharply identify classes of quantum phases distinguishable by short-range physics, *Phys. Rev. B* **92,** 104414 (2015), arXiv:1505.03171

Shenghan Jiang, Andrej Mesaros and Ying Ran, Chiral spin density wave, spin-charge-Chern liquid and d+id superconductivity in 1/4-doped correlated electronic systems on the honeycomb lattice, *Phys. Rev. X* **4**, 031040 (2014), arXiv:1404.3452

Shenghan Jiang, Andrej Mesaros and Ying Ran, Generalized modular transformations in 3+1D topologically ordered phases and triple linking invariant of loop braiding, *Phys. Rev. X* **4,** 031048 (2014), arXiv:1404.1062

**Presentations**

Quantum phases and phase transitions on fractional spin systems from no-go theorem to model simulation, seminar at KITS, Beijing, 09/2019

Ising ferromagnet to valence bond solid transition in a one-dimensional spin chain-analogies to deconfined quantum critical points, Contributed Talk, APS March Meeting, Boston, 03/2019

Symmetric tensor networks and topological phases, Entanglement on strongly correlated systems, Benasque, 02/2017

Symmetric tensor networks and topological phases, CMT seminar at University of Amsterdam, Amsterdam, 02/2017

Classification and simulation of quantum phases using symmetric tensor networks, CMT Seminars at MIT, Cambridge, 11/2016

Classification and simulation of quantum phases using symmetric tensor networks, CMT Seminars at Yale University, New Haven, 11/2016

Classification and simulation of quantum phases using symmetric tensor networks, CMT Seminars at Caltech, Pasadena, 11/2016

Classification and simulation of quantum phases using symmetric tensor networks, CMT Seminars at UC Berkeley, Berkeley, 08/2016

Anyon condensation and a generic tensor-network construction for symmetry protected topological phases, Poster Presentation, Boulder Summer School, Boulder, 07/2016

Symmetric Tensor Networksand practical simulation algorithms to sharply identify classes of quantum phases distinguishable by short-range physics, Invited Talk, Seminar at Beijing Computational Science Research Center, Beijing, 06/2016

Symmetric tensor networks and practical simulation algorithms to sharply identify classes of quantum phases distinguishable by short-range physics, Contributed Talk, APS March Meeting, Baltimore, 03/2016

Featureless Quantum Insulator on the Honeycomb Lattice, Contributed Talk, APS March Meeting, Baltimore, 03/2016

Symmetric Tensor Networksand practical simulation algorithms to sharply identify classes of quantum phases distinguishable by short-range physics, Invited Talk, Harvard CMT Kids' Seminar, Boston, 03/2016

Generalized modular transformation in 3+1D topological ordered phases and triple linking invariant of loop braiding, Poster Presentation, Aspen winter conference, Aspen, 02/2015

Generalized modular transformation in 3+1D topological ordered phases and triple linking invariant of loop braiding, Poster Presentation, IPAM workshop, Los Angeles, 01/2015