# Ning Xi 西宁

13313323073
xining@ruc.edu.cn
github.com/fizixmastr
Renmin University of China

## Biography

**Ph.D** physics student in the area of **condensed matter theory** at Renmin University
I am seeking a **postdoc position** in condensed matter theory, quantum computing, or other relevant fields.

## Research interests

Including but not limited to

**Numerical study on strongly correlated electron systems**

- Quantum criticality and emergent phenomena
- Exotic quantum phases and transitions in frustrated spin systems
- Dynamic properties of quantum spin systems in low dimensions
- Optimal solutions of nonlinear self-consistent or variational equations
- Quantum entanglement and universality

**Theoretical analysis of novel experiments**

- Optimal solutions of nonlinear equations
- Construction of effective microscopic models
- Parameter estimation and model validation based on experimental results
- Mean-field understanding and effective mapping of novel experiments

**Developing new algorithms on quantum many-body physics**

- New tensor-network algorithms on two-dimensional spin systems
- New algorithms on searching global optima or optimum parameters
- New algorithms based on mature projects or packages in engineering
- Other relevant algorithms on frustrated systems, fermion systems, or concerned systems

## Skills

Including but not limited to

**Infinite tensor-network algorithms on ground states of 2D quantum spin systems**

- Projected entangled simplex state (**PESS**) construction of frustrated spin systems
- Infinite time-evolution algorithms, including **S**imple **U**pdate, **C**luster **U**pdate, and **F**ull **U**pdate
- Variational optimization of infinite tensor network states
- Contracting the infinite networks by **CTMRG** and boundary **MPS**
- Unique techniques on **PESS** construction

**Time-evolution algorithms on quasi-1D quantum spin systems**

- Ground-state properties based on **MPS**
- Dynamical properties based on real time-evolution algorithms
- Thermodynamic properties based on **MPO**

**Optimization algorithms and fitting skills**

- Optimal solutions of nonlinear equations
- Model parameters' fitting based on experimental results

- Fitting of critical exponents and behaviors

**Basic skills for Ph.D students in the area of condensed matter theory**

- Basic mean-field approximation
- Basic transformations or mapping
- Basic critical scaling theory and dimensional analysis
- Basic symmetry analysis of Hamiltonian, Lagrangian, and experimental materials

**Coding & programming**

Skilled in MATLAB and Julia
Acquainted with python, Fortran, Mathematica, and C language

## EDUCATION

**Doctor of Science** | ***Theoretical physics*** Advisors : **Rong Yu** 俞 榕
Renmin University of China | 2012 – 2016 **Z. Y. Xie** 谢志远

**Bachelor of Science** | ***Optical information science and technology***
Hebei University | 2012 – 2016

## PUBLICATIONS

1. **Ning Xi**, Hongyu Chen, Z. Y. Xie, and Rong Yu, First-order transition between the plaquette valence bond solid and antiferromagnetic phases of the Shastry-Sutherland model, arXiv:2111.07368
2. **Ning Xi** and Rong Yu, Dynamical Signatures of Deconfined Quantum Critical Point in One Dimension, *In Preparation*
3. **Ning Xi**, Xiao Wang, Jianda Wu, and Rong Yu, Robust evidence for emergent $E_8$ spectra in the $CoNb_2O_6$, *In Preparation*
4. Yuchen Fan, **Ning Xi**, Changle Liu, Rong Yu, and Bruce Normand, Criticality and quantum critical end point in the fully frustrated bilayer Heisenberg antiferromagnetic model under a magnetic field, *In Preparation*
5. Yi Cui, Haiyuan Zou, **Ning Xi**, Zhangzhen He, Y. X. Yang, L. Shu, G. H. Zhang, Z. Hu, T. Chen, Rong Yu, Jianda Wu, and Weiqiang Yu, Quantum Criticality of the Ising-like Screw Chain Antiferromagnet $SrCo_2V_2O_8$ in a Transverse Magnetic Field, Phys. Rev. Lett. **123**, 067203(2019)

## PRESENTATIONS

**"Ground State Phase Diagram of a $J_1$-$J_2$-Q model on the Shastry-Sutherland Lattice – a Tensor Network Study"**, talk presented at 2019 Beijing Summer School on Quantum Magnetism

## HONORS AND AWARDS

**"Challenge Cup"**
– National Undergraduate Extracurricular Academic Science and Technology Works Competition
*Silver-award work* 2013

**Mathematical Contest in Modeling (MCM)**
– International Contest by the Consortium for Mathematics and Its Applications (COMAP)
*Honorable Mention* 2015 & 2016

**National Encouragement Scholarship** 2013

**Excellent graduate Student of Renmin University of China** 2017

**Merit Student of Renmin University of China** 2021

**Various Excellent-Student Awards at Hebei University** 2012 - 2016

**Awards in Various Undergraduate Competitions at Hebei Province** 2012 - 2016