Ning Xi 西宁

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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

- Numerical simulation of novel experiments on quantum magnets
- 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

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 **MPS**

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***
Renmin University of China | 2012 – 2016

Advisors : **Rong Yu** 俞 榕
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 points 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