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Shun-Yao Yu

Master Student / Bachelor of Physics

I'm a master degree candidate of BUAA supervised by Prof Shoushu Gong.
I'm interested in spin liquid states and have learned basic knowledge about Kitaev's toric code model and Kitaev's Honeycomb model which believed to obtain spin liquid states as an exactly solvable model. I also learned some numerical method solving strong correlated systems such as DMRG and ED.
In the future, I'd like to learn and use tensor network methods such as peps to study the nature of quantum spin liquid phase and superconducting phase in t-J/Hubbard and other strongly correlated electron systems model.

Grade and Skills

Tools and Languages	Python, Matlab, Mathematica, LaTeX, MarkDown
Research	DMRG, Kitaev spin liquids
Communication	English, Chinese

Research experience

Spin Liquid States in Kitaev Material α - $RuCl_3$ **2021 — Present**

- Learn about spin liquid states:history and properties
- Learn about bond-directional interaction mechanism in real materials
- Learn about MPS based DMRG algorithms
- Find gapless and nematic signatures in Kitaev material candidate α -$RuCl_3$
- Complete the defense of bachelor's thesis based on the preliminary research results

I'm now using DMRG to study the material RuCl3 which is believed to be a realistic material to realize bond-directional Kitaev interactions, and get some preliminary results: that in a field perpendicular to the honeycomb plane, there may be an intermediate nematic gapless spin liquid phase between the low field zigzag phase and the high field polarized phase. Power law spin correlation functions and non zero central charge fitting are evidences supporting the conclusion.

Education

Master Degree Candidate in Physics, *BUAA* 2021-Present
Supervisor:Prof.Shoushu Gong
Research Area: Numerical and theoretical study of spin liquid states in Kitaev materials

Bachelor of Science in Physics, *BUAA* 2017-2021
Supervisor:Prof.Shoushu Gong
Thesis: Theoretical Study of Spin Liquid State in Kitaev Material RuCl3

Double degree in Applied Mathematics, *BUAA* 2018-2021

Conferences/Visiting Experience

The 10th Workshop on Quantum Many-body Computation, Liyang	August, 2022
International Workshop: Tensor Networks in Many Body and Lattice Field, SJTU	July, 2021
The 9th Workshop on Quantum Many-body Computation, RUC	April, 2019
Sakura Science exchange project, RCNP, Osaka University, Japan	October, 2018

Honors and Awards

National Scholarship of China – Undergraduate	2018
Postgraduate Freshman Scholarship in BUAA	2021
The First Prize of Scholarship in BUAA	2020
The Special Prize of Scholarship in BUAA	2018
The First Prize of the 10th National College Students' Mathematics Competition (non Mathematics Major)	2018