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Quantum spin liquid, topological order and entanglement entropy

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Quantum spin liquids (QSLs) are elusive magnets without magnetism, resisting symmetry breaking even at zero temperature due to strong quantum fluctuations and geometric frustration. The simplest QSLs known theoretically are characterized by topological order, i.e., topological QSL, and support fractionalized excitations. However, there is no practical way to directly determine the topological nature of the states. In my talk, I will introduce a simple and practical approach, i.e., cylinder construction, to identify topological order by entanglement entropy. As an example, by extracting accurate topological entanglement entropy (TEE), we identify the quantum spin liquid ground states with topological order in the antiferromagnetic spin-1/2 Heisenberg model on the Kagome lattice. Finally, I will also try to talk about the finite-size corrections to TEE, and its relevance to QSLs, as well as future searches for topological ordered phases.

Biography

Hong-Chen Jiang has completed his PhD from Tsinghua University in China, and Postdoctoral studies from Microsoft Research Station Q and Kavli Institute for Theoretical Physics in University of California at Santa Barbara. After that, he spent half a year in University of California at Berkeley. Now, he is a Staff Scientist of Stanford Institute for Materials and Energy Science of SLAC National Accelerator Laboratory and Stanford University.

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