Identifying the nature of various quantum spin liquids on kagome lattice YIN-CHEN HE, Fudan University, Shanghai, China, DONG-NING SHENG, California State University, Northridge, YAN CHEN, Fudan University, Shanghai, China — We develop the density matrix renormalization group approach to systematically identify the topological order of the quantum spin liquid (QSL) through adiabatically obtaining different topological sectors of the QSL on an infinite cylinder. As an application, we study the easy axis anisotropic kagome Heisenberg model known for hosting a Z2 QSL, however no numerical simulations have been able to access all four sectors before. We obtain the complete set of four topological degenerate ground states distinguished by the presence or absence of the spinon and vison quasiparticle line, which fully characterizes the topological nature of the quantum phase. Using the four topological degenerate sectors, we calculate the modular matrix, which gives the braiding statistics that fits the Z2 QSL. We also find other type of QSL on kagome lattice, its nature has been identified through the modular matrix, etc. Finally, we study the kagome Heisenberg model, where our results have the potential to solve many mysteries and non-consistencies of former study on this model.

[1] Yin-Chen He, D. N. Sheng, and Yan Chen, arXiv: 1309.5669
[2] Yin-Chen He, D. N. Sheng, and Yan Chen (in preparation).

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