MERA study of quantum spin models on triangular lattice

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Frustrated quantum systems research is one of the most challenging areas of computational condensed matter physics and a number of important questions could be answered once we obtain a good method for tackling the problem. In most cases, however, we either encounter so-called negative sign difficulty or the problem of exponentially-long computational correlation time, or both. The method of MERA is a special implementation of the tensor tree network (TTN), for which the practical computational complexity is not yet known. In other words, it is one of few methods for which there is a room for some hope. However, even with MERA, we need to deal with computational resource proportional to some high power of the system size, and we face an potimization problem of the network structure. We consider a quantum spin system on a triangular lattice as an example and show that we can squeeze it down to m^14 where m is the dimension carried by a leg of a tensor.