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## Tensor-Network Assisted Quantum Algorithms for Quantum Simulations

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Quantum simulations stand out as a particularly promising application of quantum computers. The noisy intermediate-scale quantum (NISQ) devices pave the way for the development of fault-tolerant quantum computers. However, the presence of noise and decoherence in current noisy quantum devices necessitates the use of hybrid quantum algorithms based on low-depth circuits to achieve promising results. In this context, the initialization of quantum algorithms with a suitable initial ansatz becomes crucial. Tensor network methods, well-established techniques for classical simulations of quantum many-body systems, offer a valuable approach to enhance state preparation in quantum algorithms. In this presentation, we demonstrate how tensor network methods can improve the performance of a specific quantum algorithm. By using these methods to prepare an optimized ansatz and feeding it into the algorithm, we show significant enhancements in the results obtained.

**Primary author:** JAVANMARD, Younes (Leibniz University Hannover)

**Presenter:** JAVANMARD, Younes (Leibniz University Hannover)

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