

# Meetings of the Belgian Quantum Physics Initiative

## Colloquium



**Prof. Ignacio Cirac**

**Max Planck Institute of Quantum Optics**

### Tensor Networks: Basic results and applications

Certain Quantum Many-body states can be efficiently described in terms of tensor networks. Those include Matrix Product States (MPS), Projected Entangled-Pair States (PEPS), or the Multi-scale Entanglement Renormalization Ansatz (MERA). Some of them play an important role in quantum computing, error correction, or the description of topological order in condensed matter physics, and are widely used in computational physics.

In this talk, I will briefly review one of the basic results in the theory of tensor networks and explain some of its applications in the classification of gapped phases in spin systems, the description of lattice gauge theories, or the characterization of quantum cellular automata. This basic result addresses the following question: if two different tensors generate the same state, how are they related to each other? Apart from that, I will mention some connections between Tensor Networks and Machine Learning in the context of many-body quantum systems as well as supervised learning.

**Thursday 13th DECEMBER 2018 AT 2.00 P.M.**

**COFFEE AND TEA WILL BE SERVED AT 3.00 P.M.**

Two short talks will follow:

**4pm: Alex Bols (KU Leuven)**

« Topological constraints on quantum charge transport »

**4:30pm: Gertjan Roose (Ghent Univ.)**

« Anomalous domain wall condensation in a semionic Ising chain »

**Espace Baudouin**

**Académie Royale de Belgique**

**Rue Ducale 1, 1000 Bruxelles - Belgique**

contact: [ngoldman@ulb.ac.be](mailto:ngoldman@ulb.ac.be)