

Meetings of the Belgian Quantum Physics Initiative

Colloquium



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Quantum simulation of high-energy physics with cold atoms

Classical computers have an exceedingly hard time describing the out-of-equilibrium dynamics of quantum many-body models. The reason can be traced back to a generic growth of many-body entanglement over time, which is exponentially hard to represent in classical memory. An intriguing alternative, commonly known as quantum simulation, is to exploit the intrinsic entanglement in physical quantum devices, which are engineered to reproduce the desired many-body dynamics in a controlled environment.

Here, I will present recent advances in a particularly rewarding target for quantum simulation, gauge theories that describe fundamental interactions of particles. I will briefly introduce existing proof-of-principle examples in programmable quantum computers, I will present promising prospects for near-term quantum simulation of relevant physical phenomena, and I will highlight the outstanding challenges that will have to be overcome to achieve fully-grown quantum simulation of gauge theories beyond the capabilities of classical computers.

Thursday 4th OCTOBER 2018 AT 2.00 P.M.

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

Two short talks will follow:

4pm: Serghei Klimin (Antwerp Univ.)

« Anderson-Bogoliubov modes of superfluid Fermi gases in the BCS-BEC crossover at nonzero temperatures »

4:30pm: Leonardo Novo (ULB)

« The complexity of measuring the energy of a quantum system »

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