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Analog Quantum Simulation: from many to few body problems

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Many-body quantum systems are very difficult to simulate with classical computers, as the computational resources (time and memory) usually grow exponentially with the size of the system. However, quantum computers and analog quantum simulators can perform that task much more efficiently. In this talk, I will first show how those devices can be use to compute physical properties at finite temperatures overcoming the so-called sign problem. I will then focus on analog quantum simulation with cold atoms in optical lattices and describe methods for tackling physics and chemistry problems with such a system.

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