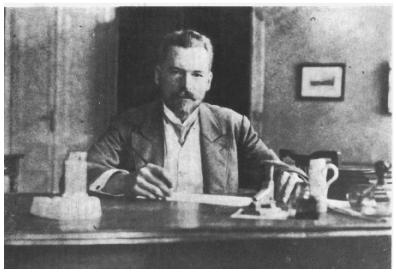

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A quantum thermodynamics approach to optimization in complex systems

Monday, 25 September 2023 09:00 (40 minutes)

An optimization problem can be translated into physics language as the quest for the energy minimum of a complex system with a Hamiltonian that encodes the problem itself. Stretching the analogy further, the optimization problem can be seen as the controlled cooling of such a complex system so as it lands in a minimum of its complex energy landscape corresponding to the optimal solution of the given problem.
I will introduce and discuss two methods for quantum cooling, and thus for optimization, entailing the use of quantum, non-Markovian baths connected to the system of interest. In the first method the bath is prepared in a suitable low energy initial state that efficiently cools down the system of interest. In the second method the bath is measured, and post-measurement excited states of the bath are selected, that correspond to low energy states for the system of interest.

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