

The speed limit and information propagation

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Abstract

Recently, the speed of state change in quantum dynamics has attracted much attention, since the quantum devices associated with the quantum information theory demand finite time procedure with high quality of Fidelity. The quantum speed limit goes back to Mandelstam and Tamm in 1945, and Margolus and Levitin in 1998, respectively. This type of relation or concept is nowadays extended to many fields. We also have a closely related concept of speed in many-body physics, i.e., the Lieb-Robinson bound. The Lieb-Robinson bound tells us the prohibited region of information propagations of any physical objects. This provides a basis to derive many fundamental relations in many-body physics. The speed limit and Lieb-Robinson bound are complementary to each other. In the lecture, I start with the introduction to these two. I next talk on the recent progress toward the unified approach with the Wasserstein distance measure in the speed limit approach.

References

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