

Quantum Simulation of an Extra Dimension

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Abstract

We present a general strategy to simulate a $D+1$ -dimensional quantum system using a D -dimensional one. We analyze in detail a feasible implementation of our scheme using optical lattice technology. The simplest nontrivial realization of a fourth dimension corresponds to the creation of a bi-volume geometry. We also propose single- and many-particle experimental signatures to detect the effects of the extra dimension.

References

- [1] O. Boada, A. Celi, J. I. Latorre, and M. Lewenstein, *Phys. Rev. Lett.* **108**, 133001 (2012)