北京大学量子材料科学中心
International Center for Quantum Materials, PKU

Seminar

Sculpting dynamic quantum error correcting codes with measurements

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Time: 10:00 am, April. 3, 2024 (Wednesday)

时间：2024年4月3日 （周三）上午10:00

Venue: Room w563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

It has long been appreciated that quantum error-correcting codes have a deep connection to topological phases of matter. Nevertheless, their relation is still contrasted by the fact that traditional many-body quantum theory is developed solely based on unitary aspects, while quantum error-correcting codes significantly relies on measurements in order to detect errors. Recently, a novel type of quantum error correcting code called “Floquet codes” was introduced which (unlike traditional error correcting codes) feature a schedule of measurements that anticommute from round to round. I will show how insights from quantum phases of matter can be used to give a physical understanding to these new error correcting codes, in particular, a surprising connection between projective measurements and the Bose-Einstein condensation of quasiparticles in the corresponding topological phase. Finally, I will demonstrate that periodicity in time of the measurements is in fact not required, unlocking a more general construction of “dynamic codes” that are capable of performing not only quantum error correction, but also fault-tolerant quantum computation without requiring any unitary evolution.

About the speaker

Nat Tantivasadakarn obtained his Ph.D. from Harvard University and is currently a Burke postdoctoral fellow at Caltech. His research interests explore the interplay between topological phases of matter, quantum error correction and computation, non-equilibrium quantum dynamics and generalized symmetries.