Quantum Computation Introduction

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Logistics

Info (dates, speakers, references) is hosted on:
`https://www.tsvan.xyz/reading.html`
Follow John Preskill's notes
`http://theory.caltech.edu/~preskill/ph219/ph219_2021-22.html`
Helpful videos:

1. Preskill's class: `https://www.youtube.com/playlist?list=PL0ojjrEqIyPy-1RRD8cTD_lF1hflo89Iu`
2. UC Berkeley Vazirani's class: `https://www.youtube.com/playlist?list=PLXEJgM3ycgQW5ysL69uaEdPoof4it6seB`

Basics: Complex Vector Space

A *complex vector space* is a non-empty set $\mathbb{V}$, whose elements we call vectors, with three operations

1. Addition $+ : \mathbb{V} \times \mathbb{V} \to \mathbb{V}$
2. Negation $- : \mathbb{V} \to \mathbb{V}$
3. Scalar multiplication: $\cdot : \mathbb{C} \times \mathbb{V} \to \mathbb{V}$

and a distinguished element called *zero vector* $0 \in \mathbb{V}$. The operations above obey usual rules with the scalar multiplication obeys rules for complex numbers.

Example

$\mathbb{C}^n$, space of complex polynomials $\mathbb{C}[x]$, space of complex-valued square integrable functions $L^2(\mathbb{R}; \mathbb{C})$.

(Un)fortunately, we do have to work with complex numbers...