양자정보이론 연구실 (Quantum Information Theory)

QIT@KAIST EE

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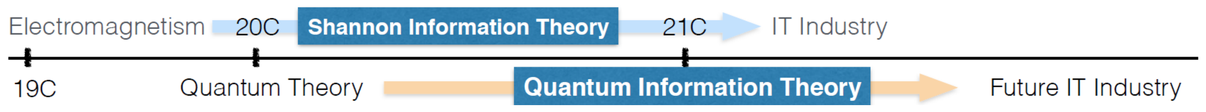
◀◀ Websites https://sites.google.com/view/qitkaist



■ Contact information

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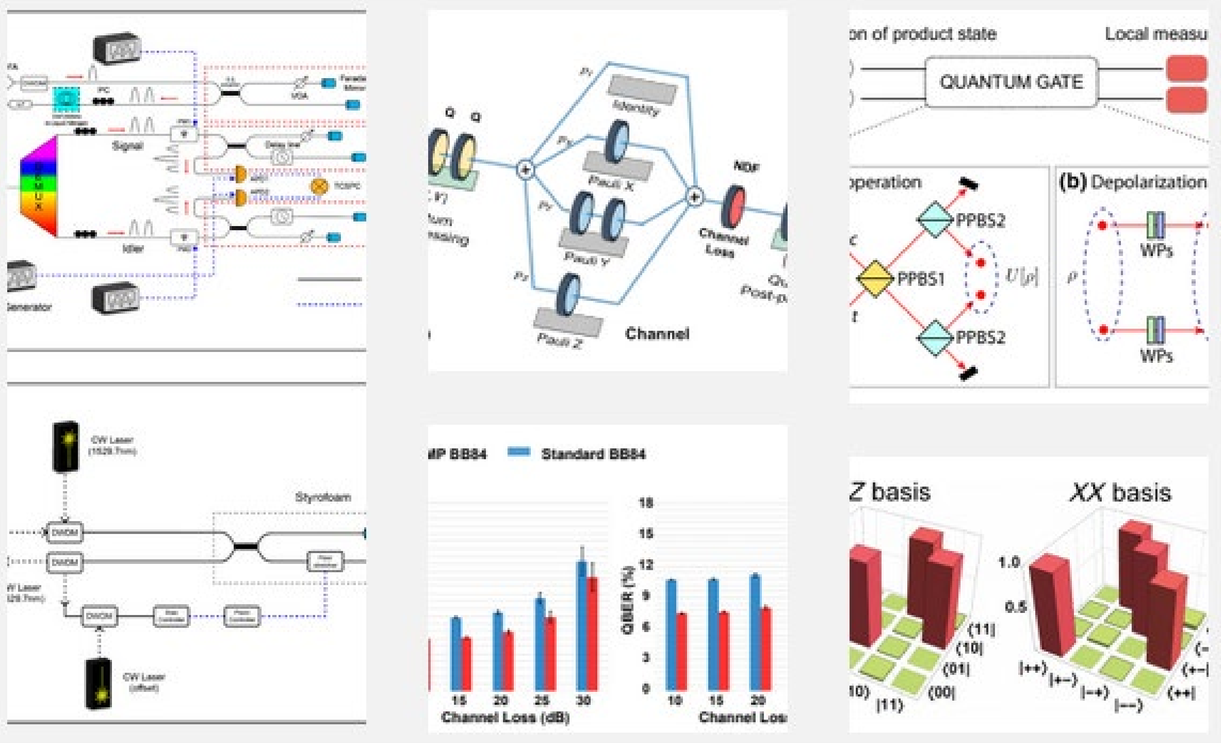
Fundamentals to Applications

"We're working on fundamental problems in QIT to understand information processing at the most fundamental level and to break the limits in today's technologies"

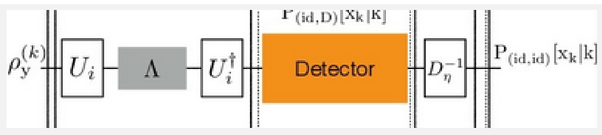
Collaborations with experimentalists

- We're theorists working with experimentalists



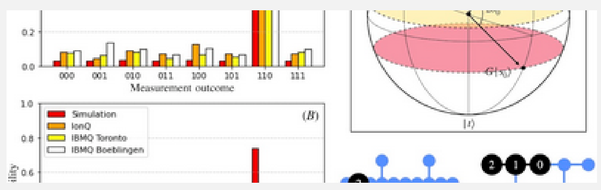
Quantum Computing: Algorithms and Hardware Interface

- We're quantum engineers to develop the present-day quantum technologies
- We develop quantum algorithms that are better fitted with current quantum technologies and also devote our efforts to dealing with quantum noise.

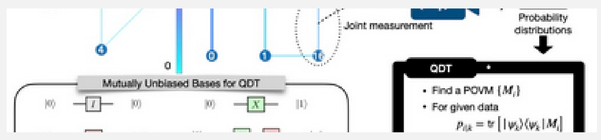


Designing a detector for mitigating measurement readout errors in NISQ computing

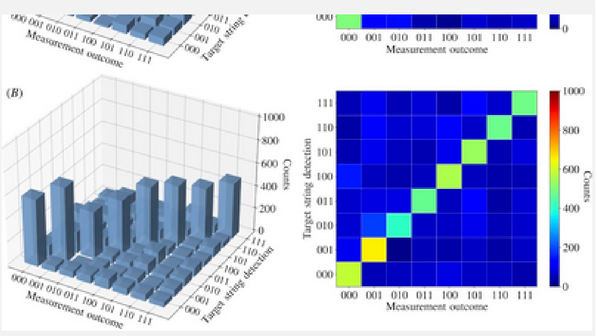
Enhancement of NISQ computing and algorithms by quantum error mitigation. Example: IBMQ Yorktown & IBMQ Essex.



Realizing a single QAAO in IBMQ



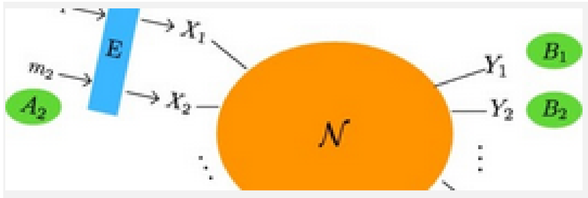
Verifying crosstalk errors in NISQ



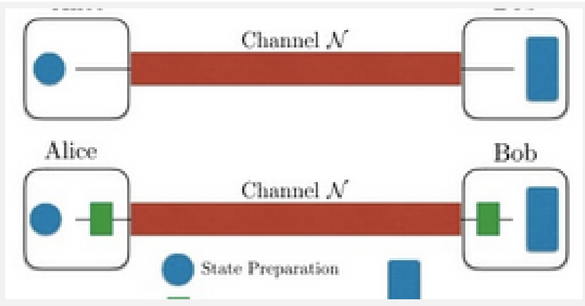
Realizing 3-qubit quantum database search in IonQ

Quantum channels and Quantum protocols

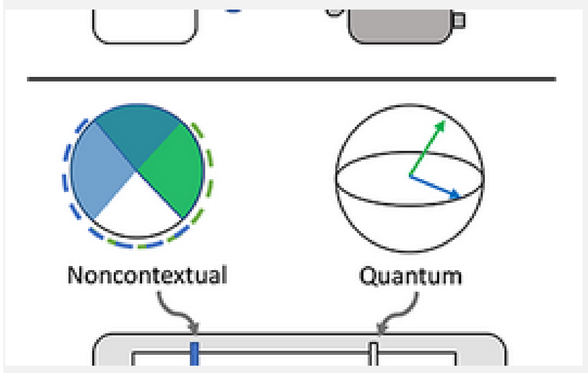
- We characterize fundamental limitations
- Quantum protocols can realize information theoretic security, enhance channel capacities, and open monogamous correlations in a network theory.



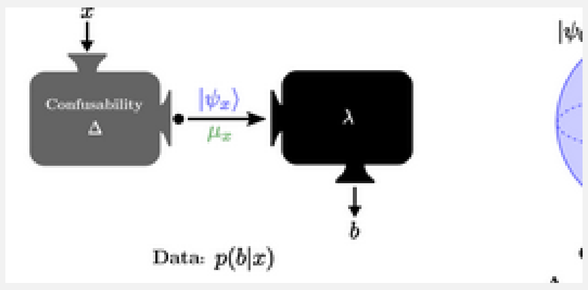
Two-sender and two-receiver interference channel. Two senders encode messages with nonlocal correlations.



Local operations and classical communication can preserve an optimal quantum measurement.



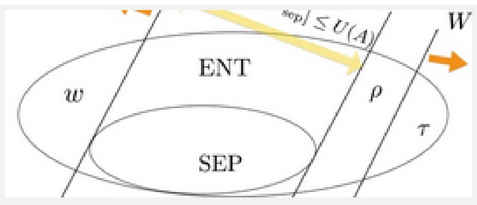
Higher confidence on a quantum measurement over a classical model



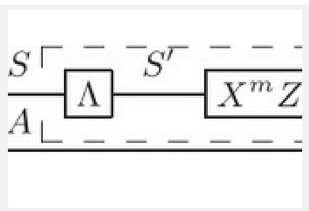
Randomness certification in a semi-device-independent scenario

Entanglement Theory

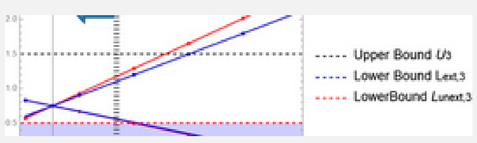
- We work on theoretically challenging problems.
- Entanglement is a resource in quantum information processing. We are interested in entanglement and its practical properties.



An entanglement witness corresponds to two hyperplanes, both can certify entangled states.



The more entangled a state is, the more useful it is for channel discrimination tasks



Detecting entangled states depends on the choice of MUBs

Activities besides research

- Our group is international. There are postdoctoral researchers and PhD students from abroad, and frequent visitors from Europe, Asia, and the US.
- We enjoy going out to eat. We will discover nice restaurants nearby.

Recommended Courses & Career after graduation

- Courses: Basics of quantum information and quantum computing.
- All careers related to quantum ICT are open for future positions, academic jobs, business, and related companies.