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Distributed Quantum Sensor Networking (DQSN)

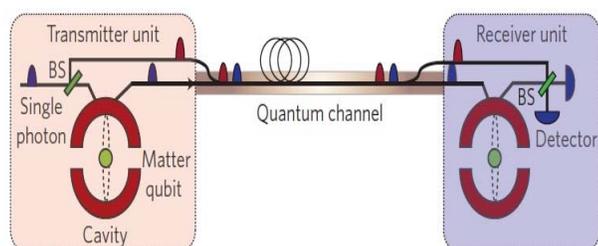
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S&T Campaign: Computational Sciences Advanced Computing Architectures

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Research Objective

- Explore and develop mathematical and computational approaches to using Quantum Sensor signals communicating across a Quantum Network for mission-critical information exchange

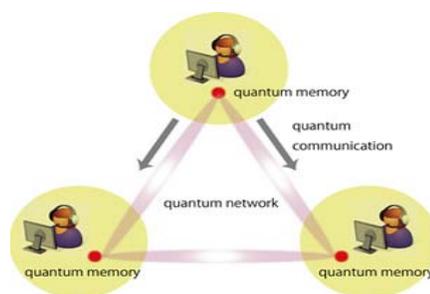


Basic Quantum Information Link

(source: <http://phys.org/news/2012-10-quantum-entanglement-faster-previously-thought.html>)

ARL Facilities and Capabilities Available to Support Collaborative Research

- Facilities at recently established Center for Distributed Quantum Information (CDQI)
- HPC Supercomputers for scalable Modeling and Simulation



Role of Quantum Memory in Quantum Network

(source: <http://www.nii.ac.jp/qis/first-quantum/e/subgroups/quantumCommunication/index.html>)

Challenges

- Mathematical modeling of the encoding and decoding of the Quantum Sensor signals as entangled qubits propagating in a noisy quantum channel
- Developing ways to mitigate the de-cohering effects of the channel noise on the measures of entanglement of the entangled qubits
- Demonstrating the advantage of Quantum Sensors over classical ones

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Quantum communication
- Quantum channel characterization and modeling, Quantum error correction
- Entanglement generation, propagation, and detection