Quantum Internet

Back before Aug. 6, 1991

Ben Wu, Chase Wallace, Yusheng Zhao

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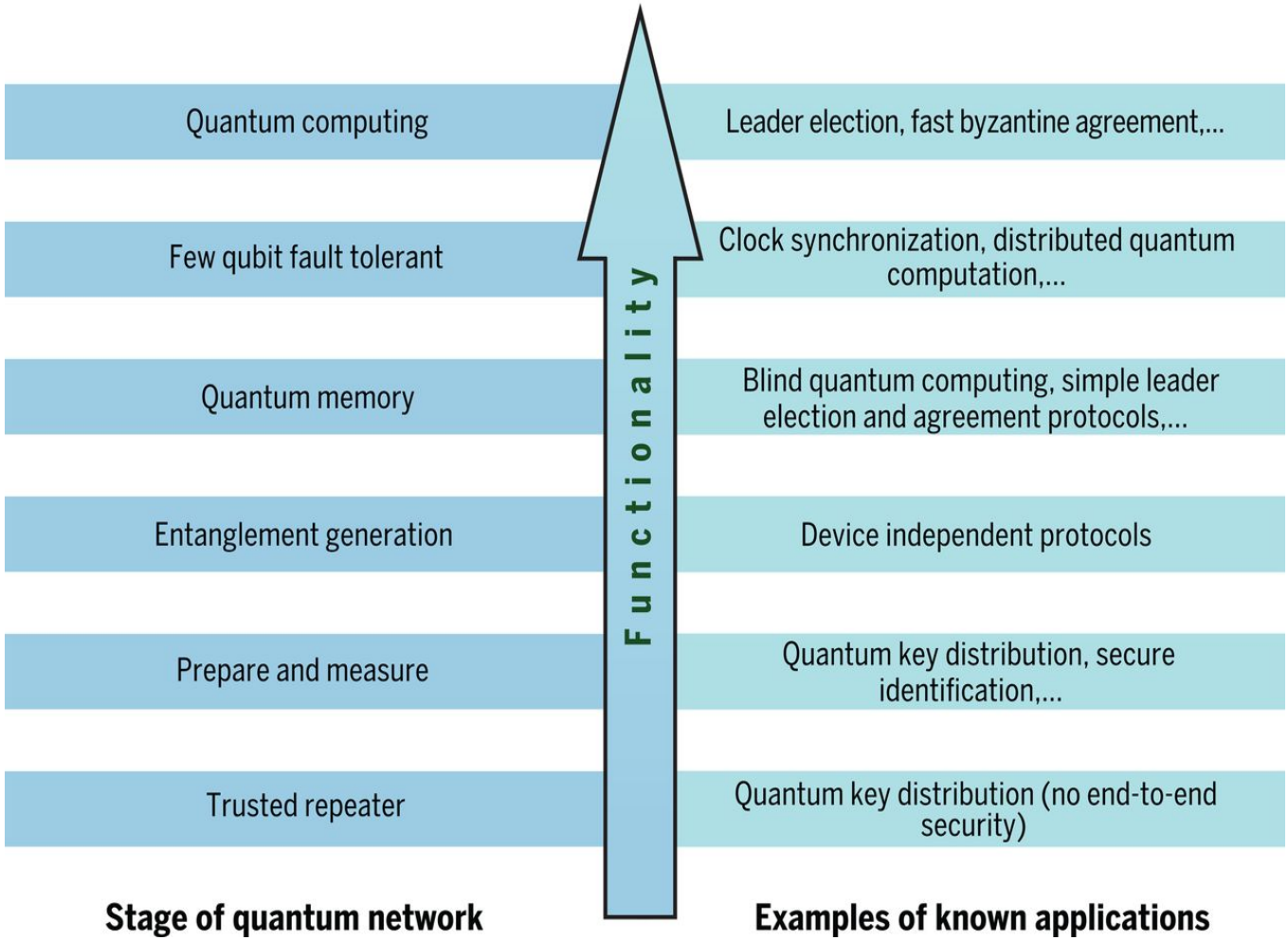
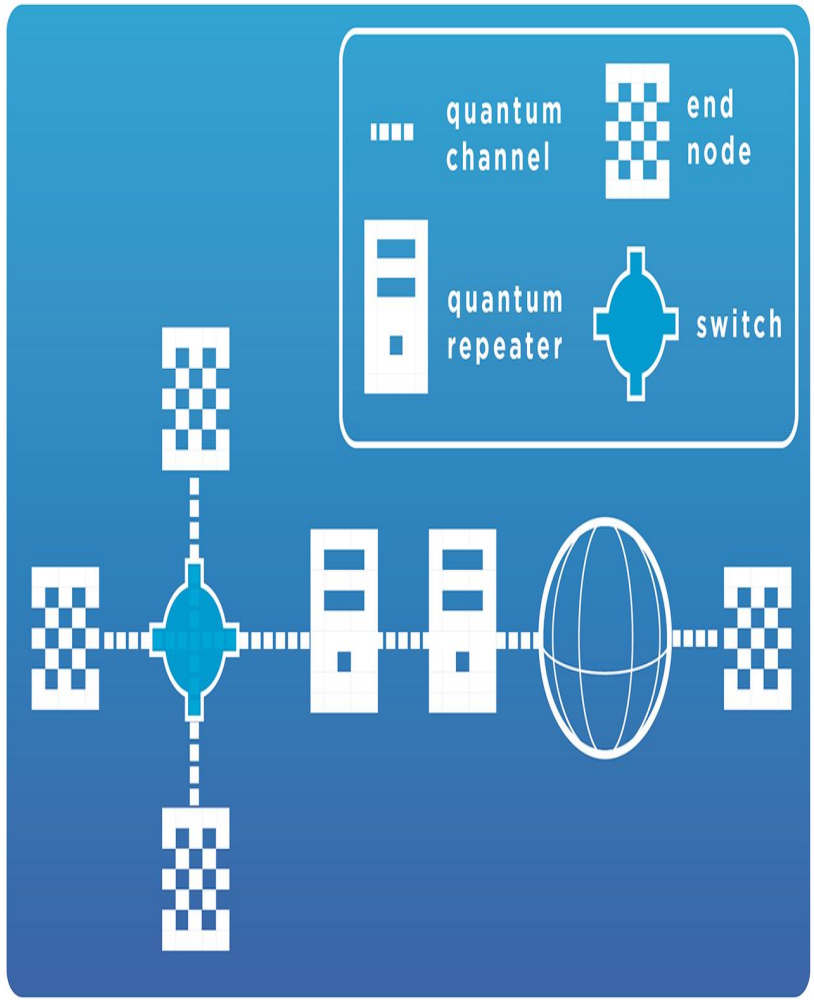
Outline

Applications: broadly speaking [1]



Components:

- Quantum Node
- Quantum Channel
- Quantum Repeater (WiFi Extender)
- Switch



Advantage of Quantum Channel [2]

- Quantum Channel provides exponential increase in computational dimension
- $k2^n$ to 2^{kn} when we connect k n-bit quantum nodes
- Help to alleviate scaling and error-correlation problem
- Simulation of evolution of quantum many-body system
- "Spin-Spin" interaction of atoms simulated by quantum channel
- Help to solve the problem of percolation
- I.e can the liquid flow from the top of a cube to the bottom. When the cube has a cheese (Tom and Jerry type of cheese)like internal structure but some of the paths are blocked with probability p. [1]

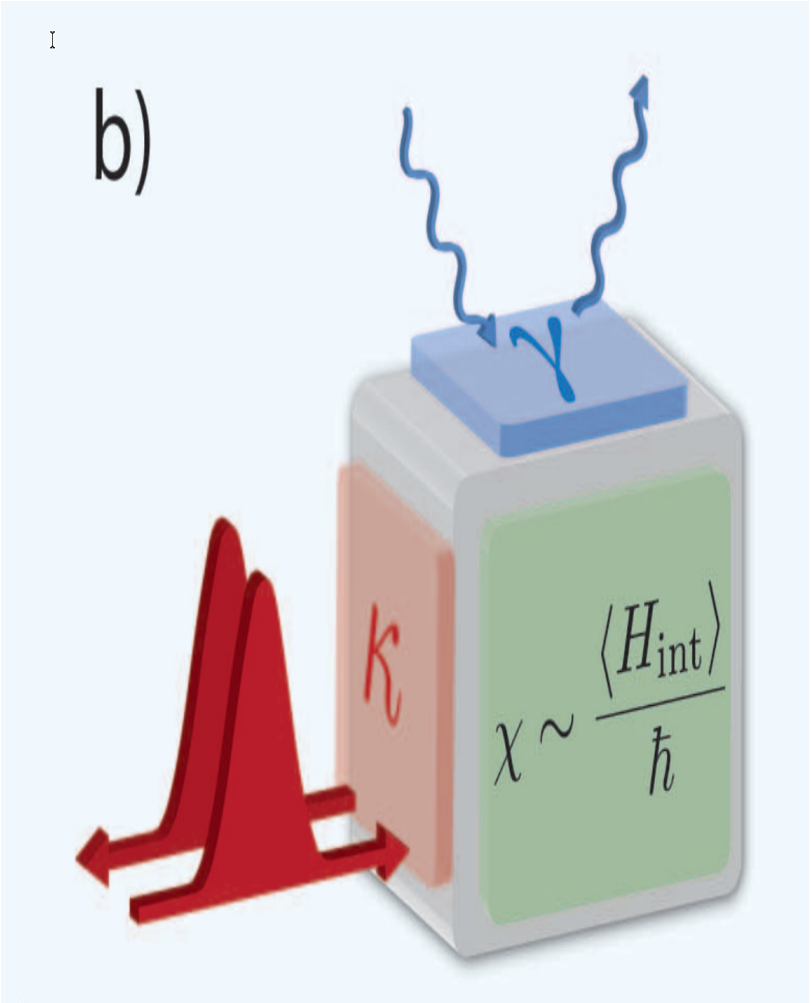
[1] Percolation Theory from Wikipedia

Focus of this presentation: Quantum Channel

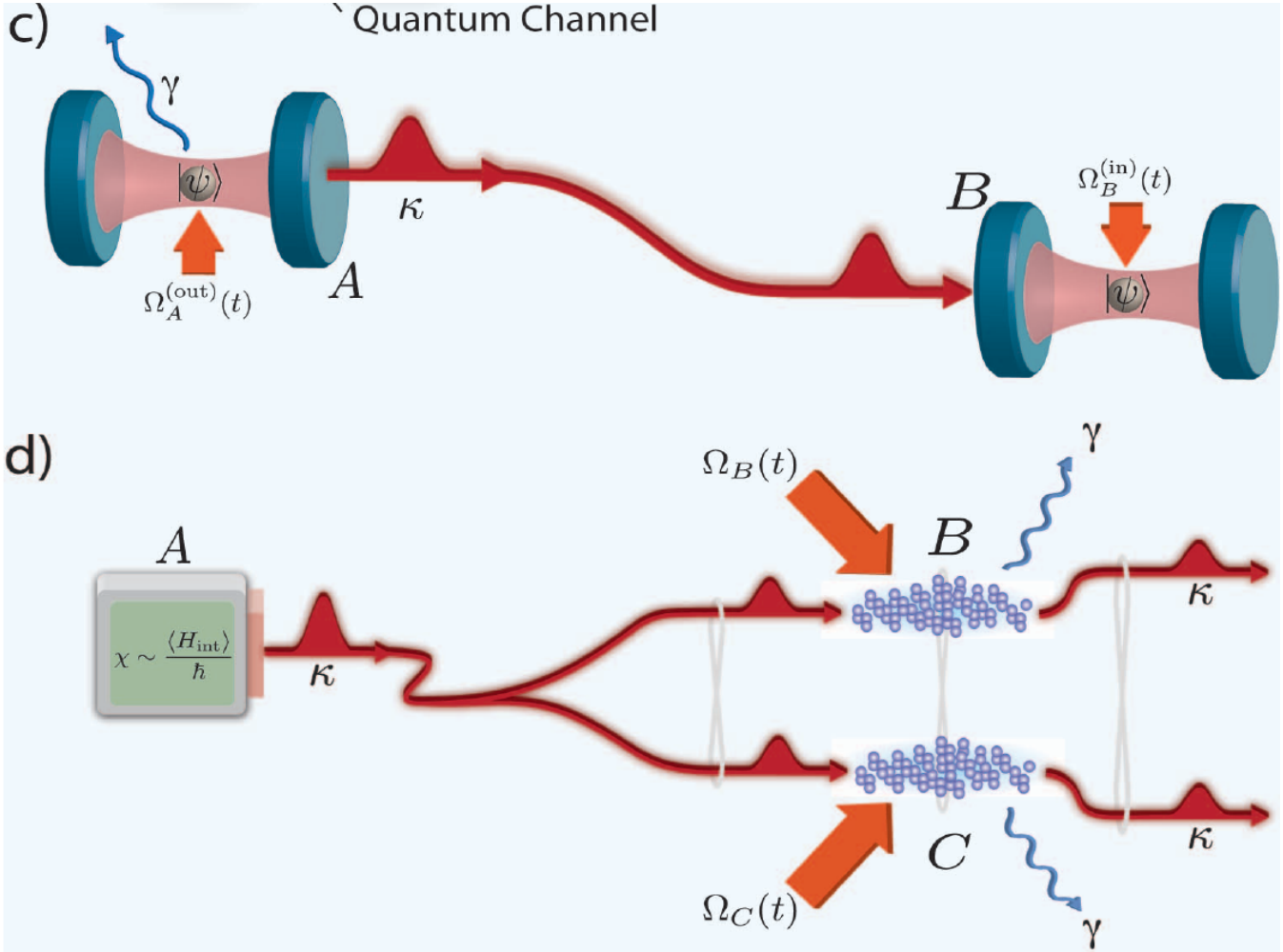
- Coupling of single photons and atoms w/ help of cavity QED
- Difficulty arises b/c photon-photon interaction cross-sections are tiny, i.e very unlikely to occur
- Quantum Information processing with atomic ensemble

Requirements for Physical Realization [2]

- Interaction between light and matter should be easily tunable
- Done through an interaction Hamiltonian $< H_{int}(t) > \approx \hbar\chi(t)$
- Physical processes that controls (t) need to be robust in the face of imperfections?
- Mistakes can be efficiently detected and fixed
- Mathematically : $\chi >> \kappa >> \gamma$



Realization Examples [2]



- Your Input needed

- Ben and Chase plz help

References I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