Quantum Cryptography

Lecture 27

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- Beyond QKD: some (limited) multi-party computation results; also, security for "quantum information"

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- But there are several possible ways to encode/decode the information in a qubit, leading to interesting properties
- A system of multiple qubits shows even more interesting properties, beyond just holding all the bits of information

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  - In either case at the end the needle is aligned along a leg of the cross (as reported by the measurement)

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  - Note: not exploiting all possibilities, but already useful

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- Will describe in terms of red/blue cards and card-readers

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    - Alice picks a seed at random and publicly sends it to Bob; shared key is defined as Extract(RawKey,Seed)

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- Quantum teleportation: Pre-processing quantum communication
  - If some "entangled" qubits are shared a priori, then can use a classical channel to "teleport" an unknown qubit (without reading it)

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  - Bell inequality: limit of correlation that is possible classically. Experimentally violated by quantum systems (with caveats)

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  - Complete proof in 1996, followed by several refined proofs

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  - Possibly using "quantum repeaters"

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  - With quantum channels, known to exist when some limited adversarial bias is allowed
  - Zero bias coin-tossing is still impossible
- Information-theoretically secure commitment?
  - Impossible even with quantum channels
- Secret-sharing: requiring quantum communication for reconstruction

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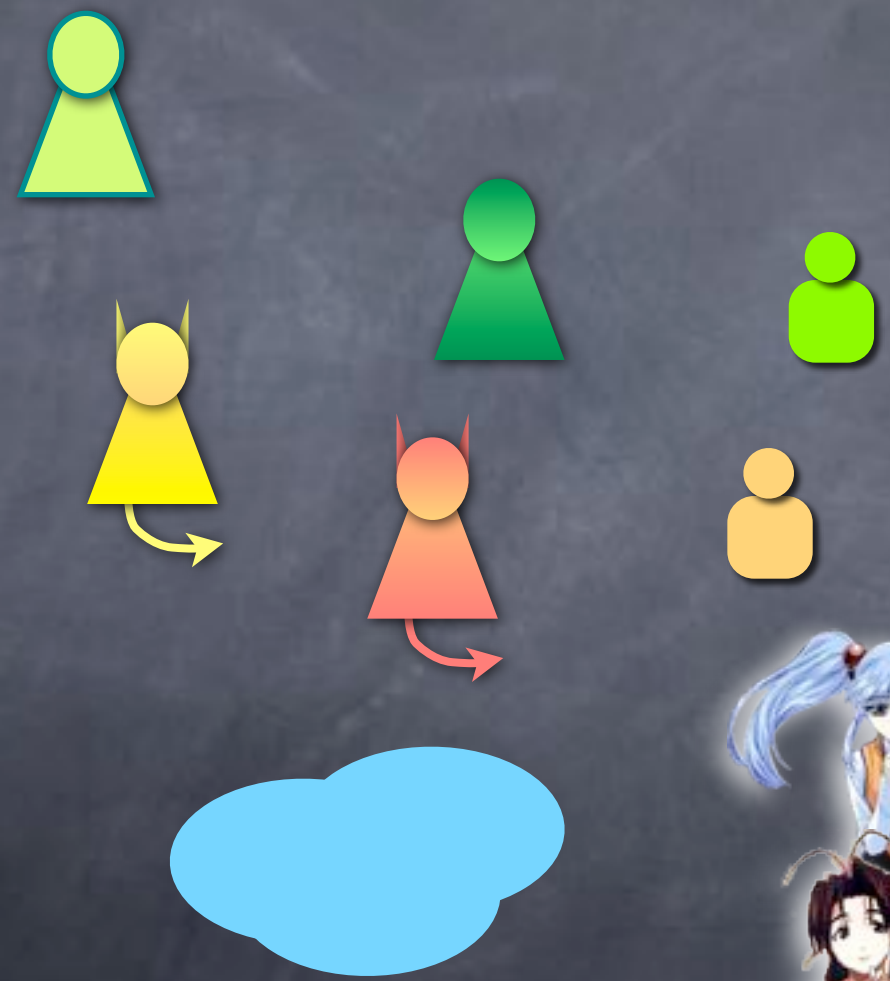

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