COLLOQUE DE PHYSIQUE EPFL

EPFL PHYSICS COLLOQUIUM

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Room CE2

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Demonstration of Quantum Error Correction using Schrödinger Cat States

A revolution is underway in the construction of 'artificial atoms' out of superconducting electrical circuits. These macroscopic 'atoms' have quantized energy levels and can emit and absorb quanta of light (in this case microwave photons), just like ordinary atoms. The large size of these 'atoms' yields remarkably strong atom-photon coupling and has given us the ability to completely control and measure the quantum state of the electromagnetic field in a cavity at the level of individual microwave photons.

In particular, it is now possible to create record large 'Schrödinger cat' photon states. In addition to being used to study quantum mechanics at macroscopic scales, these cat states form a novel basis for quantum information processing in a 'photonic' quantum computer. Recent experiments at Yale have successfully demonstrated quantum error correction that reaches the break-even point for the first time. This talk will present an elementary introduction to the field as well as an overview of recent experimental progress.

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