Quantum Optics: From Fundamentals to Applications

Winter Semester 2022/2023

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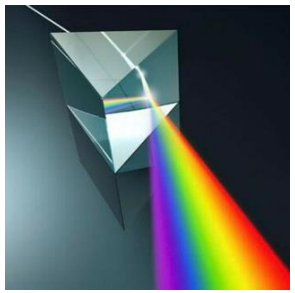
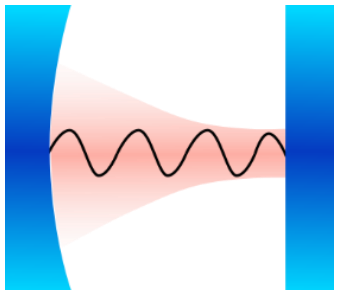
from fundamentals

- ❑ What is a photon?
- ❑ Why do we “need” them?
- ❑ How can we theoretically treat them?
- ❑ What is a quantum state of light?

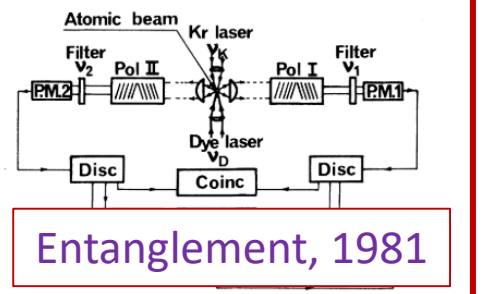




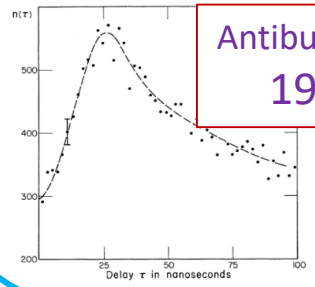
1920’s, 1930’s

through demonstrations

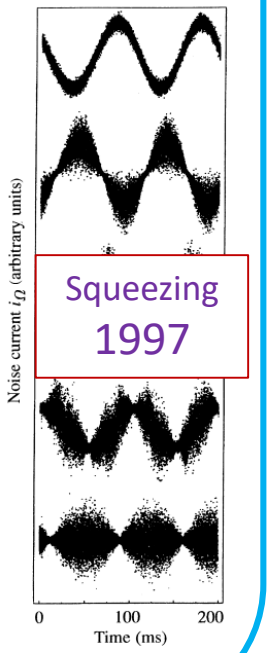
- ❑ photon antibunching
- ❑ entanglement
- ❑ squeezing
- ❑ vacuum fluctuations



Entanglement, 1981



Antibunching 1977

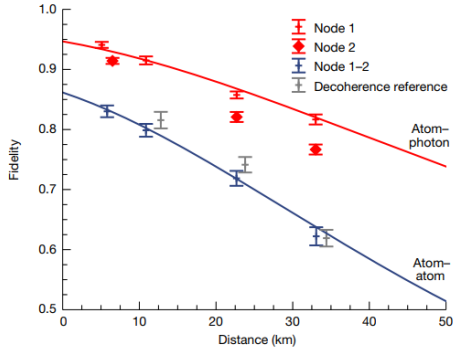


Squeezing 1997

to applications

- ❑ generating quantum light
- ❑ detecting quantum light

- ❑ quantum sensing
- ❑ quantum communication
- ❑ quantum microscopy



Entanglement over 30 km 2022

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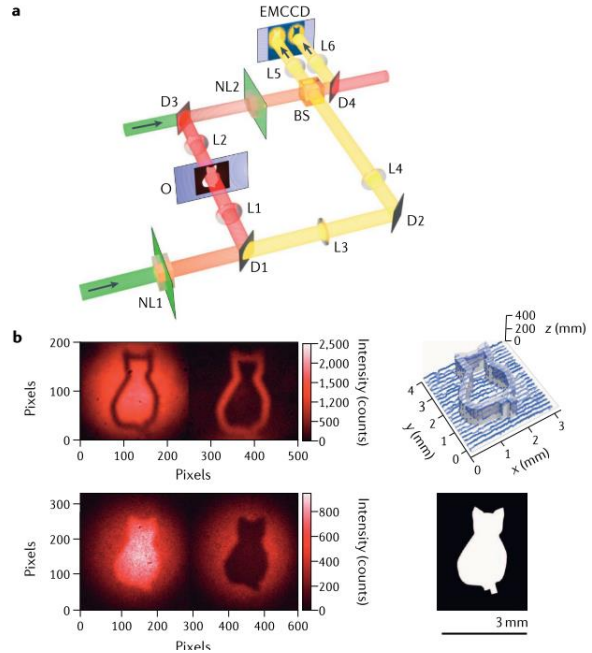
Classes

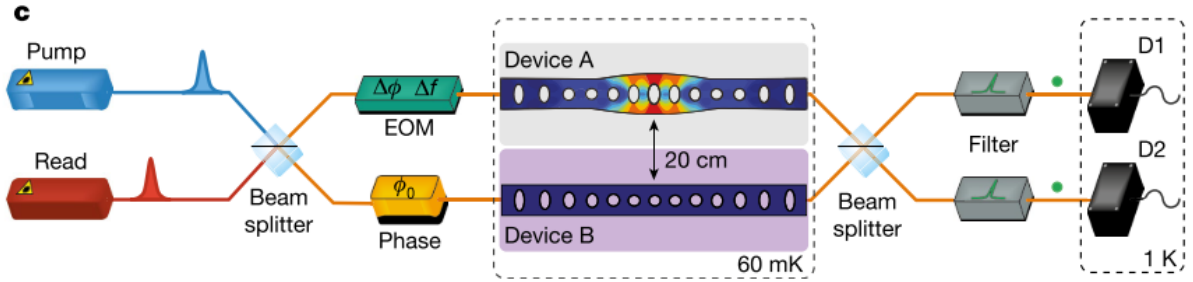
- ❑ 2x weekly meetings, 2x hours each
- ❑ 1x weekly tutorial session

Coursework

- ❑ 2-3 written worksheets
- ❑ 1 Presentation – a chance to teach each other current topics

Language = English





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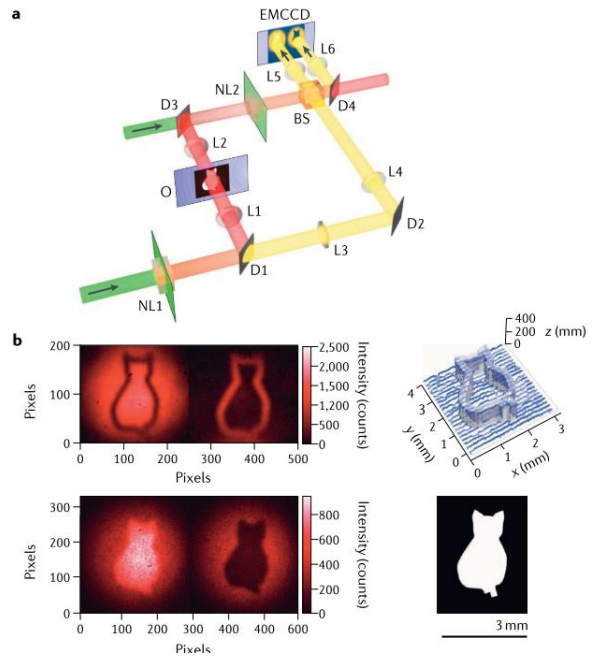

Why is it interesting?

- ❑ Possibly the purest experimental demonstrations of quantum physics
- ❑ **An ongoing technological revolution!** Many physics graduates find their work in this field

Is it for me?

- ❑ Did you enjoy quantum physics courses? Optics courses?
- ❑ Are you interested in a course that combines theory and experimental aspects and a lot of intuition?

Questions?

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