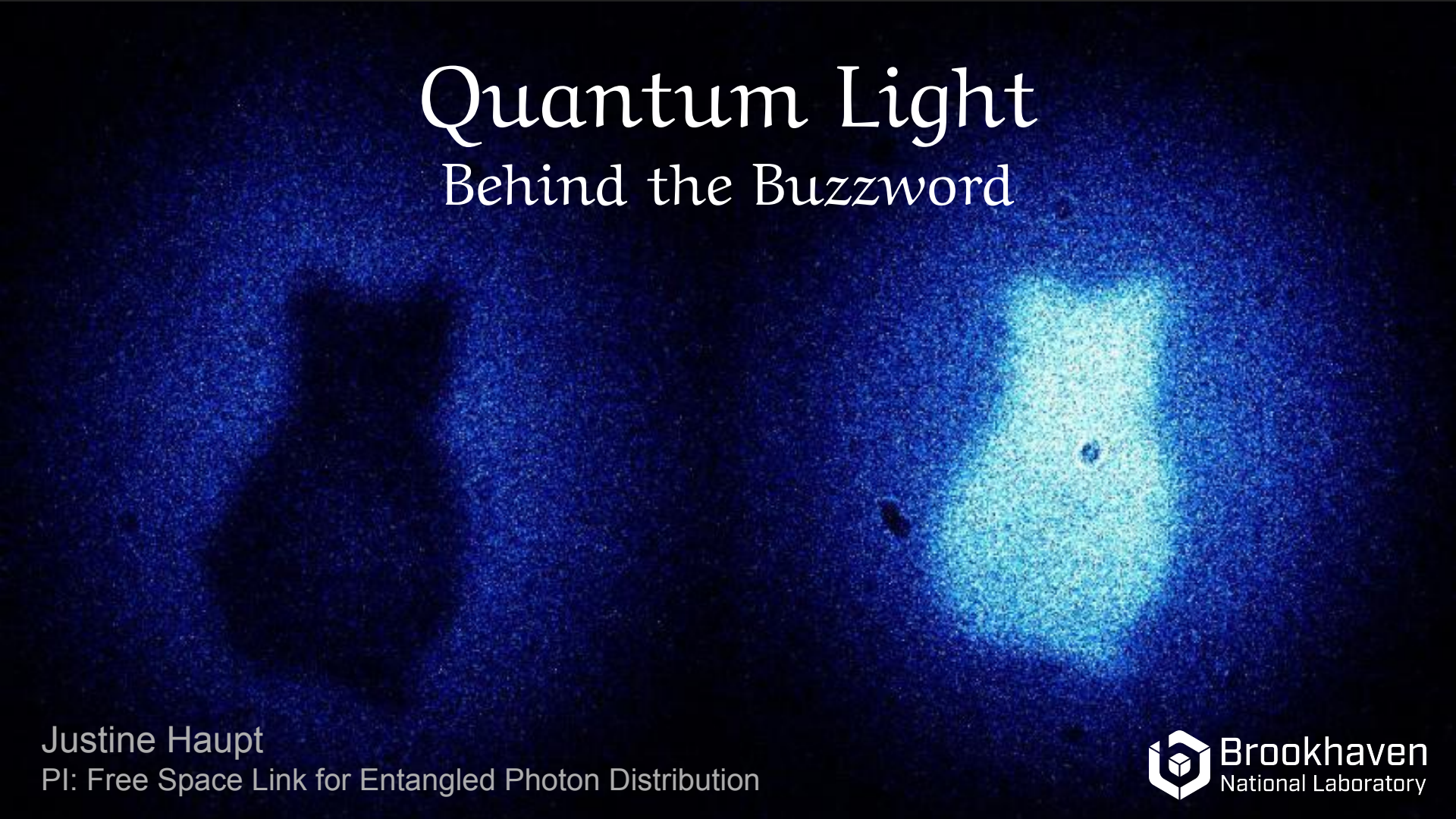
Quantum Light

Behind the Buzzword



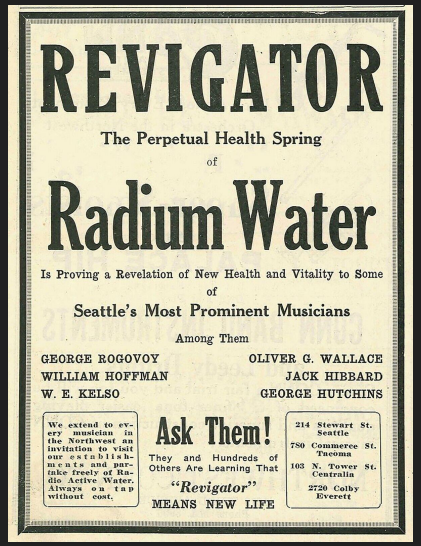
Justine Haupt
PI: Free Space Link for Entangled Photon Distribution

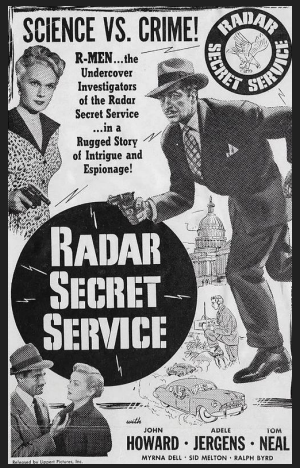
Brookhaven National Laboratory



X-rays discovered

Radium discovered





RADAR invented



Atomic age begins



1895

1898

1935

1945









We've matured





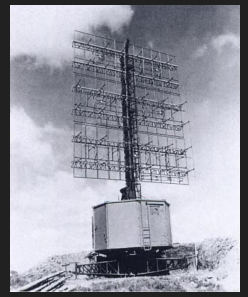





"Quantum" on Long Island
Armonk
Quantum Sails
Quantum Digital Media
Long Island Sound
Beachwood Masonry Supplies
Recently viewed
Quantum Technology Partners
Rye
Cutchogue
Mattituck
Mamaroneck
Smithtown Bay
Port Jefferson
Rocky Point
Stony Brook
Quantum Physical Therapy &...
Quantum Rehabilitation and...
Manorville
Hampton Bays
Glen Cove
Huntington
Quantum Physical Therapy &...
East Quogue
Port Washington
The Quantum Companies
Westhampton
Great Neck
Divine Quantum Wellness ~ QHHT...
Quantum Resumes
Shirley
East Moriches
Brentwood
Quantum EMS
Patchogue
Mastic Beach
Quantum Medical Billing Solutions
Sayville
Quantum Legacy Solutions
West Babylon
Bay Shore
Quantum Massage and bodyworks |...
Fire Island National Seashore
Great South Bay
Quantum Physical Therapy &...
Long Beach

100 years later





1895 X-rays discovered

1898 Radium discovered

1900 Quantization explains blackbody spectrum (Plank)

1905 Photons explains photoelectric effect (Einstein)

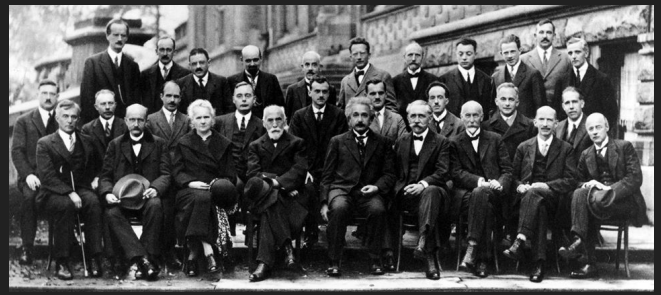
1913 Quantized model of hydrogen atom (Bohr)

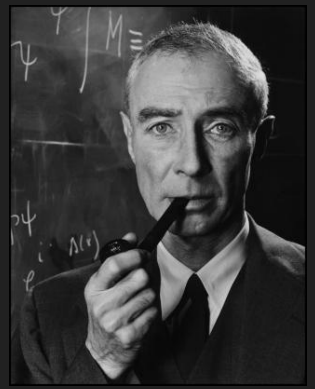
1923–1928 de Broglie, Pauli, Heisenberg, Schrödinger, Dirac

1935 RADAR invented

1945 Atomic age begins

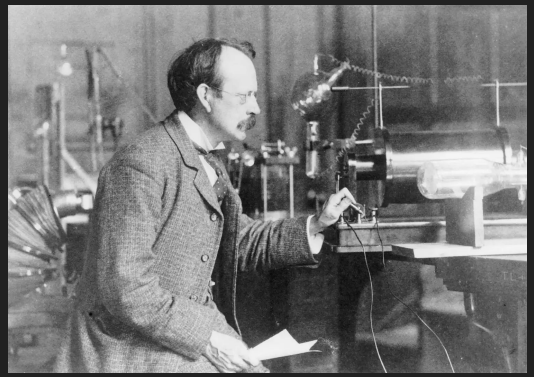




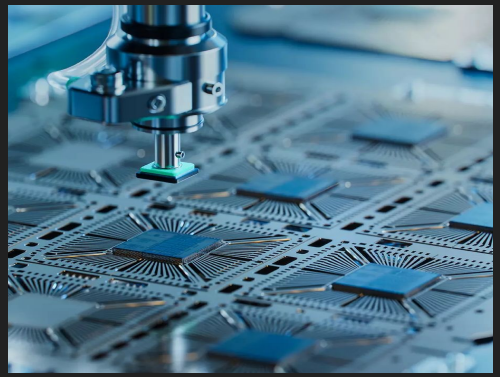


From science to engineering

CLASSICAL PHYSICS



e.g. J. J. Thomson (electron)



ELECTRONICS
WIRELESS TECH.

RADIOCHEMISTRY



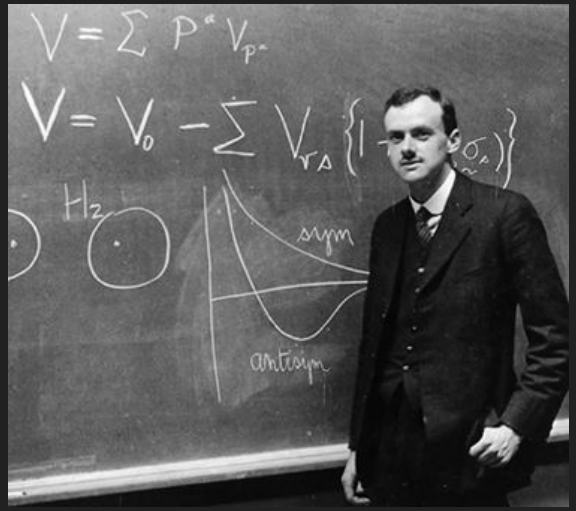
e.g. Marie Curie (2 Nobel prizes)



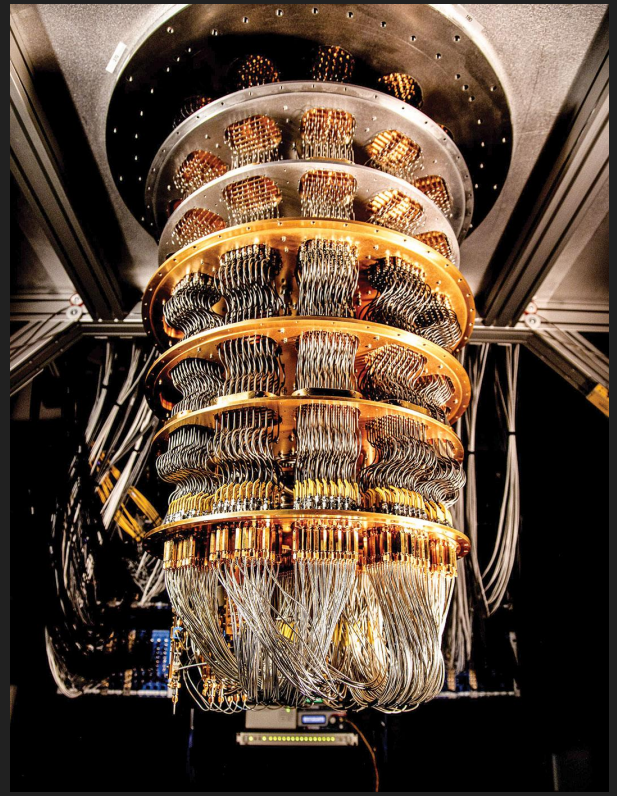
MEDICAL IMAGING
RADIOTHERAPY

From science to engineering

QUANTUM MECHANICS



Paul Dirac



QUANTUM COMPUTING

The word “quantum”





Nature is quantized

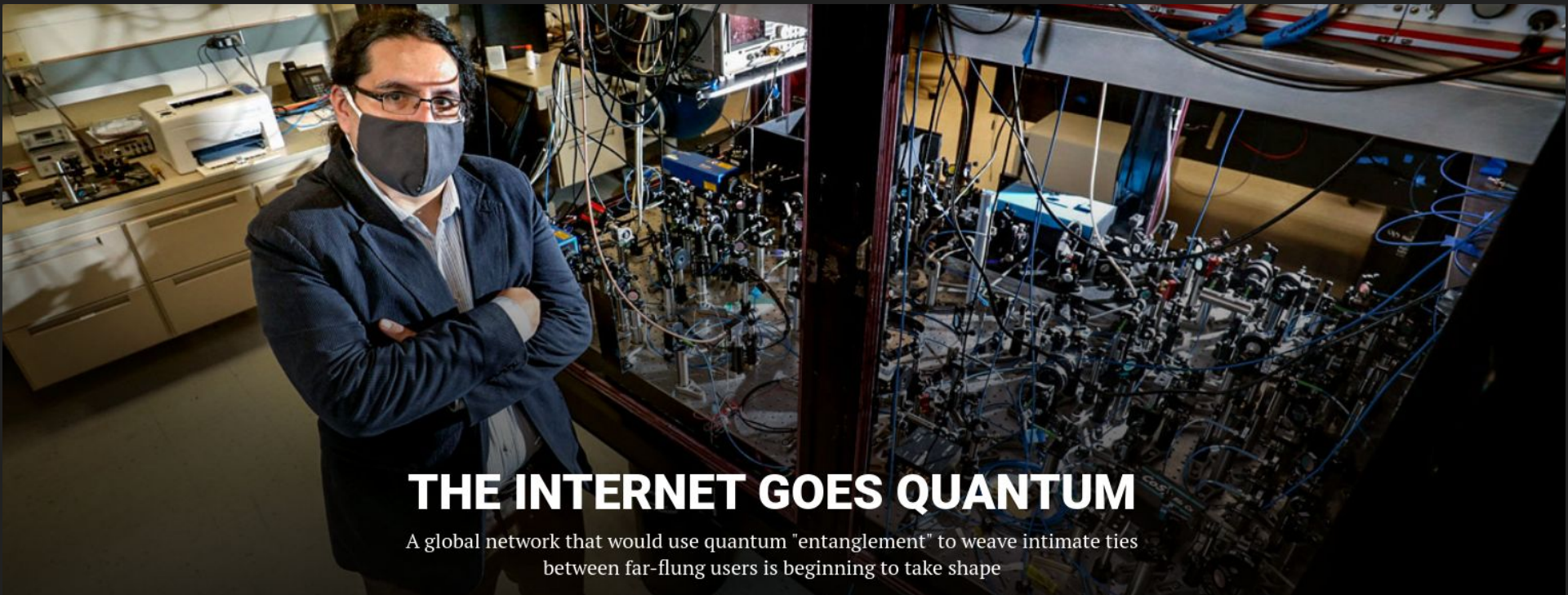
We call the **set of rules** that govern mechanics at this scale

quantum mechanics

Entanglement



Center for **D**istributed
Quantum **P**rocessing

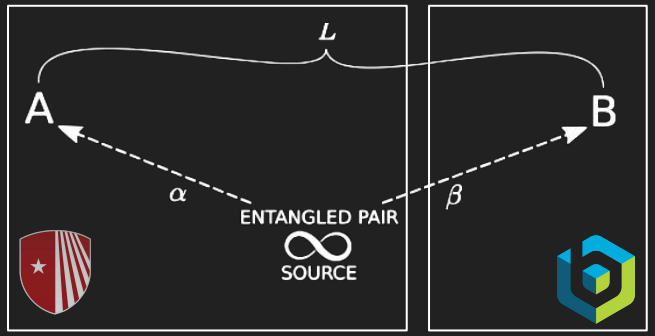


THE INTERNET GOES QUANTUM

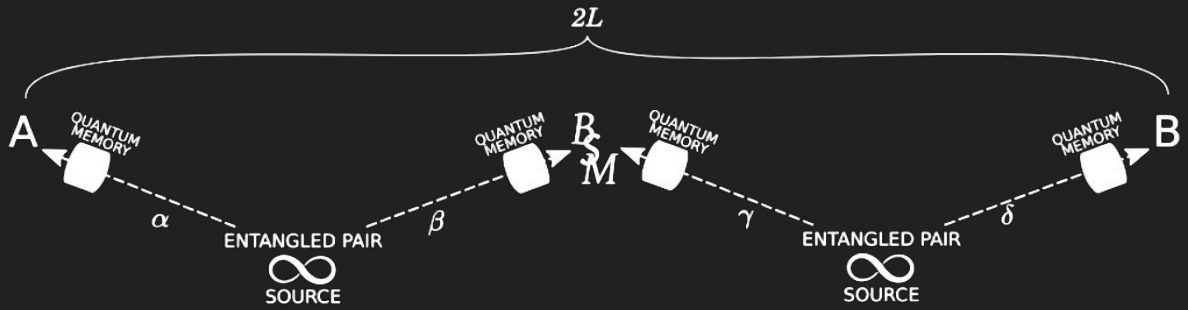
A global network that would use quantum "entanglement" to weave intimate ties between far-flung users is beginning to take shape

Quantum Networking

- Make entanglement a resource… ***distribute entanglement***







NY Quantum Network

Largest in US

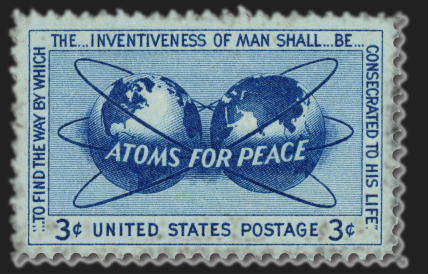
And now: Wireless (free space)





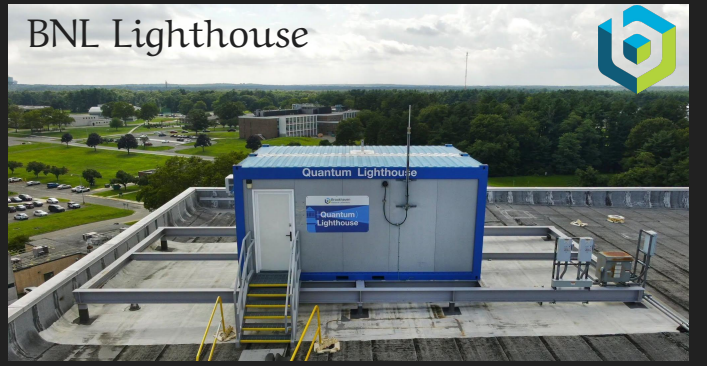
Quantum Lighthouse

Free space optical link for distributing entangled photons



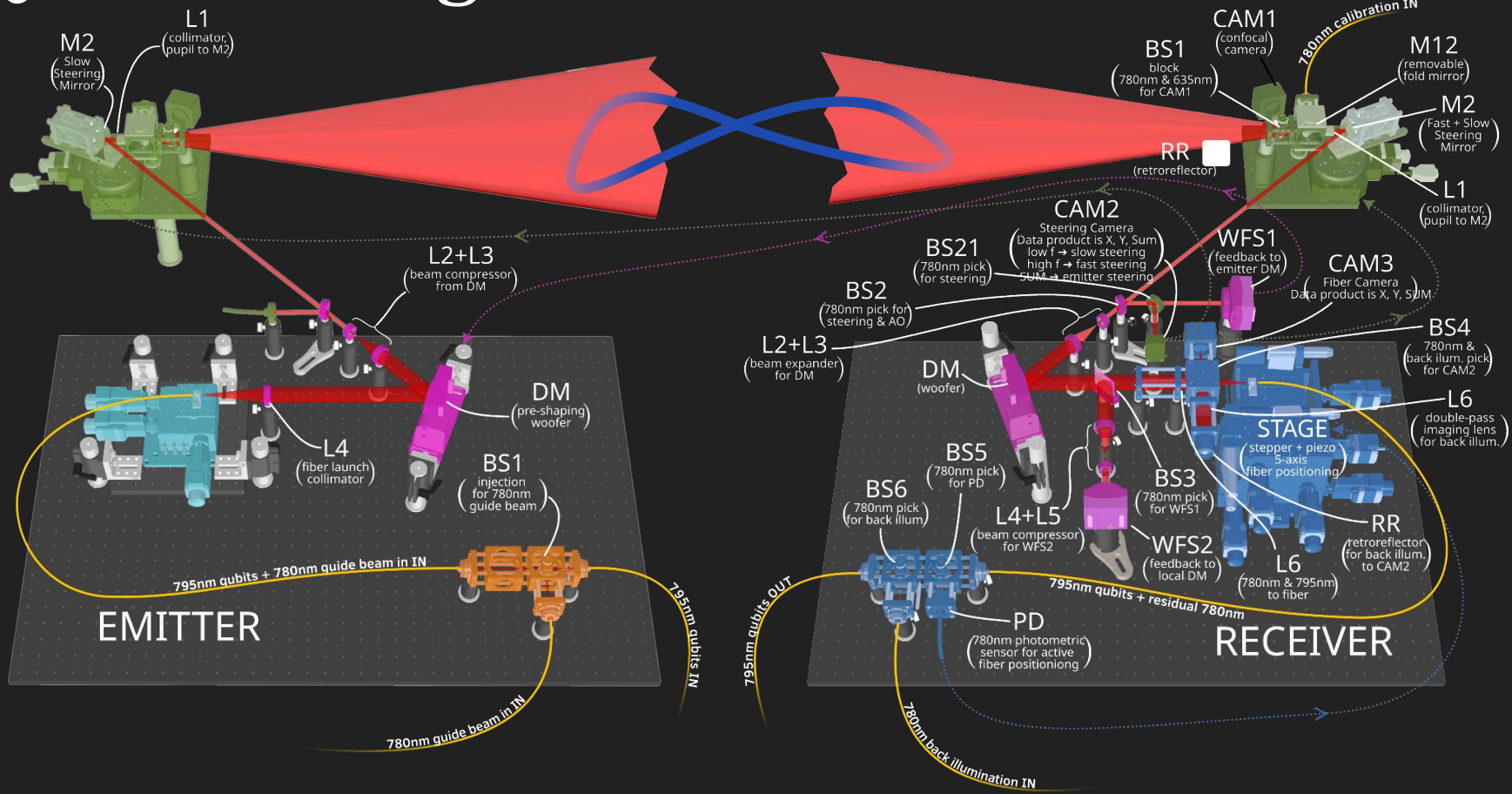








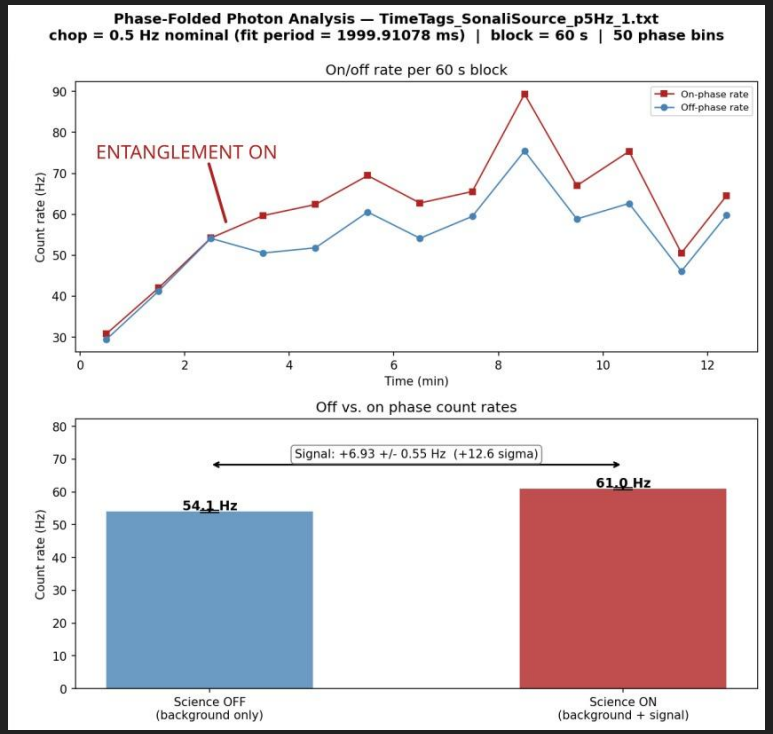
Quantum Lighthouse



Quantum Lighthouse







2nd Quantum Revolution

Harness spooky quantum phenomena in engineered systems

Possible applications:

- Computing
- Cryptography
- Distributed Quantum Processing
- Basic Science
- Sensing

***Can't** do faster than light communication*



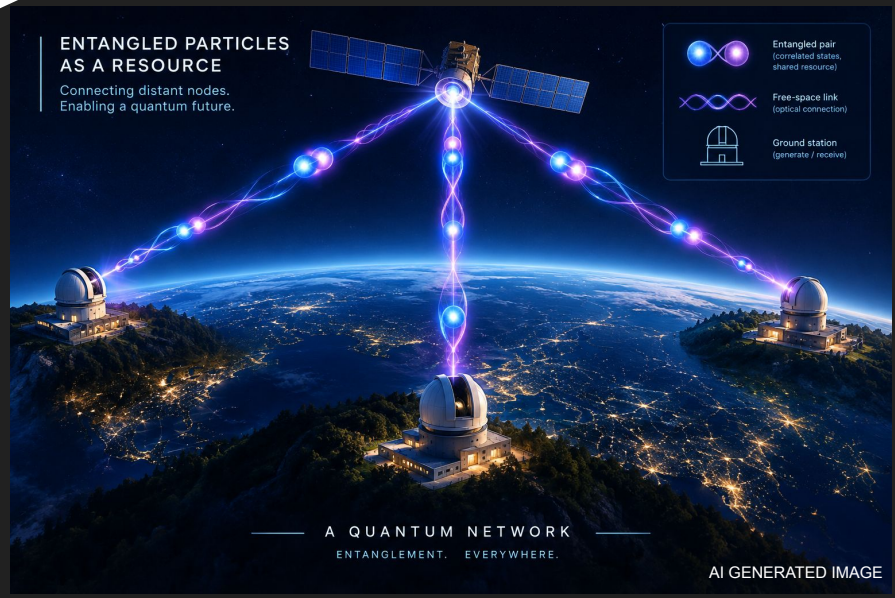
2nd Quantum Revolution

Harness spooky quantum phenomena in engineered systems

Possible applications:

- Computing
- Cryptography
- Distributed Quantum Processing
- Basic Science
- Sensing

requires distributing entanglement
E.g. quantum networking



◆ ◆ ◆





