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Quantum Technologies: The Future of Missouri Networks

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MOHEIT

4/9/26

Overview

- Why are quantum technologies necessary for networks?
- Current quantum networks / SUNY Town Hall
- Challenges for quantum networks in existing fiber plants
- Quantum networks and education
- Quantum's future in Missouri
- Questions?

Why are quantum technologies necessary in networks?

- Security
- Bandwidth and connecting Quantum computers

Security

- Emerging technologies such as self-driving cars, robots, and weapon-carrying drones raise concerns about hacking and hostile takeovers.
- Unlike classical networks, where information is encoded in binary bits (0s and 1s), quantum networks rely on the unique properties of quantum bits, or qubits, such as superposition (where a qubit can exist in multiple states simultaneously) and entanglement.
- Entanglement is established between optical nodes. Any attempt to eavesdrop breaks the

Bandwidth and connecting Quantum computers

- Up to twice as fast as traditional optical networks
- Required to connect quantum computers at full speed

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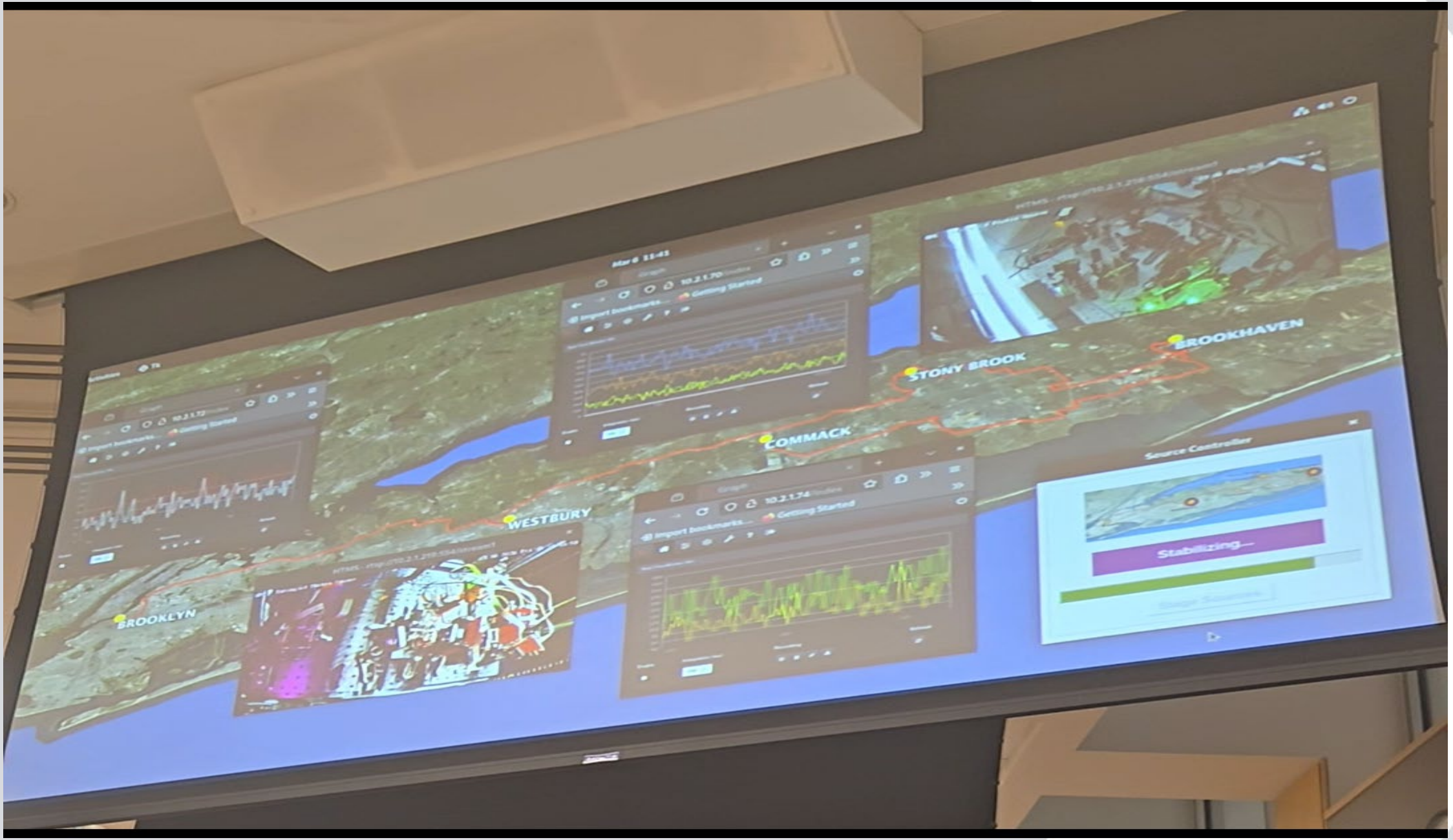
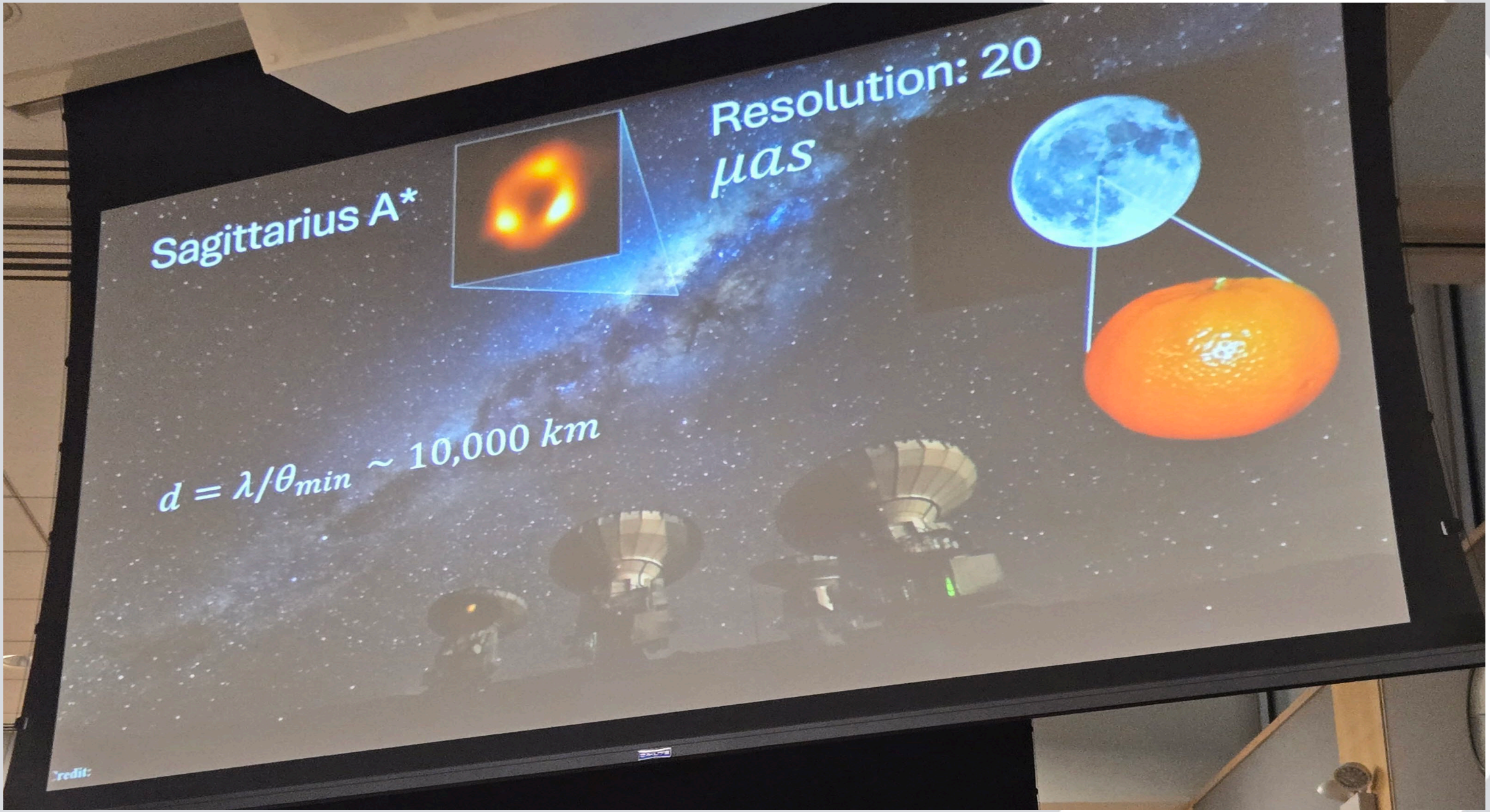
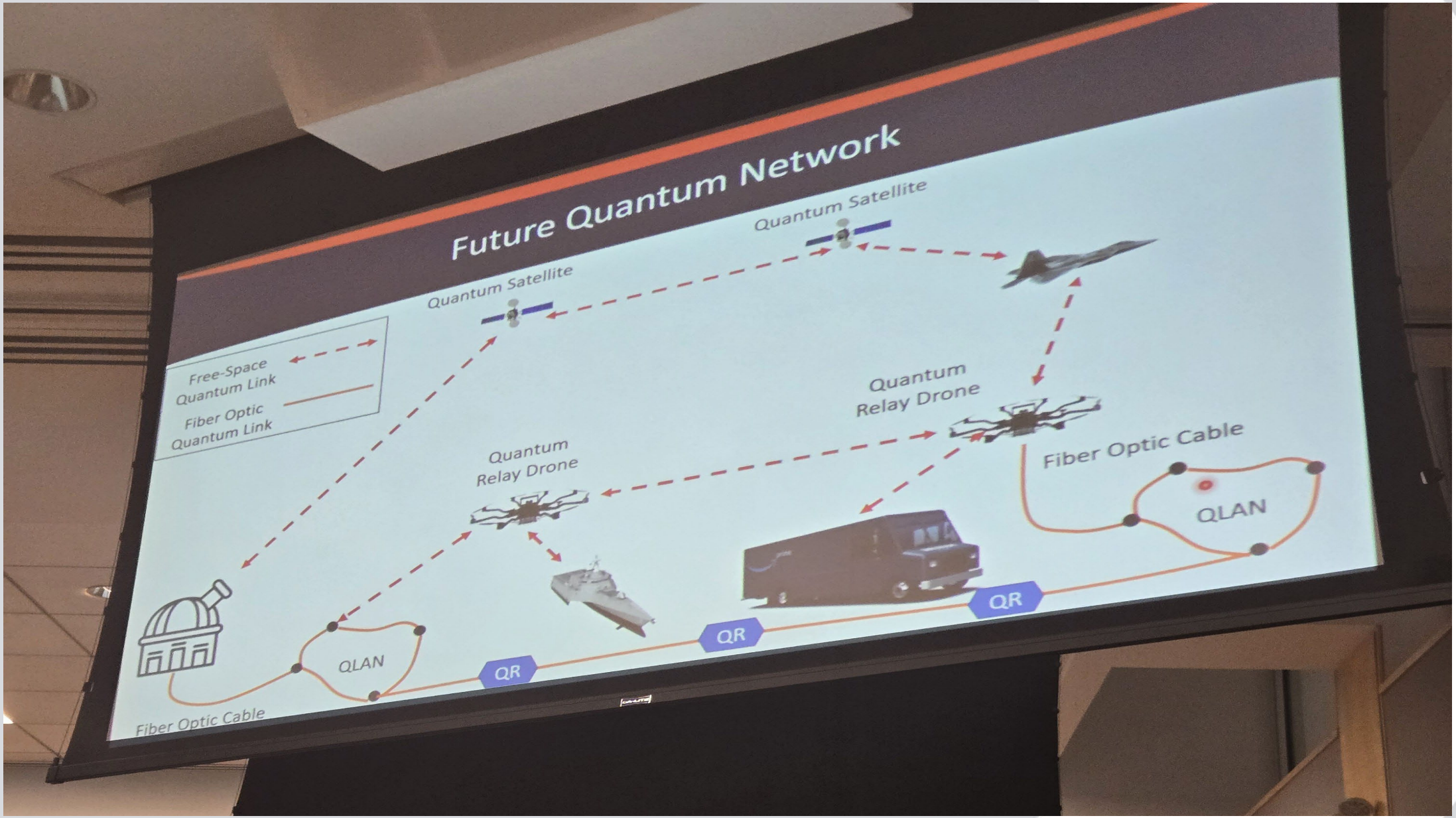
2026 Quantum Networks Town Hall

- Hosted by Eden Figueroa and Stoney Brook University(SBU) in New York.
- The goal was to bring telecommunications network operators and quantum researchers together to better understand the challenges for quantum deployment on classical optical networks.
- Demonstration of quantum network operation


SBU
Stony Brook University
WBY
LONG ISLAND
BKN
Qunnect
~67km
~71km
~75km
~62km
BNL
Brookhaven
National Laboratory
CMK
RICOH
Remote Network
Demonstration
16
Chase Wallace | QN Town Hall


BROOKLYN
WESTBURY
COMMACK
STONY BROOK
BROOKHAVEN
Source Controller
Stabilizing...


Sagittarius A*
Resolution: 20 μas
$d = \lambda/\theta_{min} \sim 10{,}000\ km$



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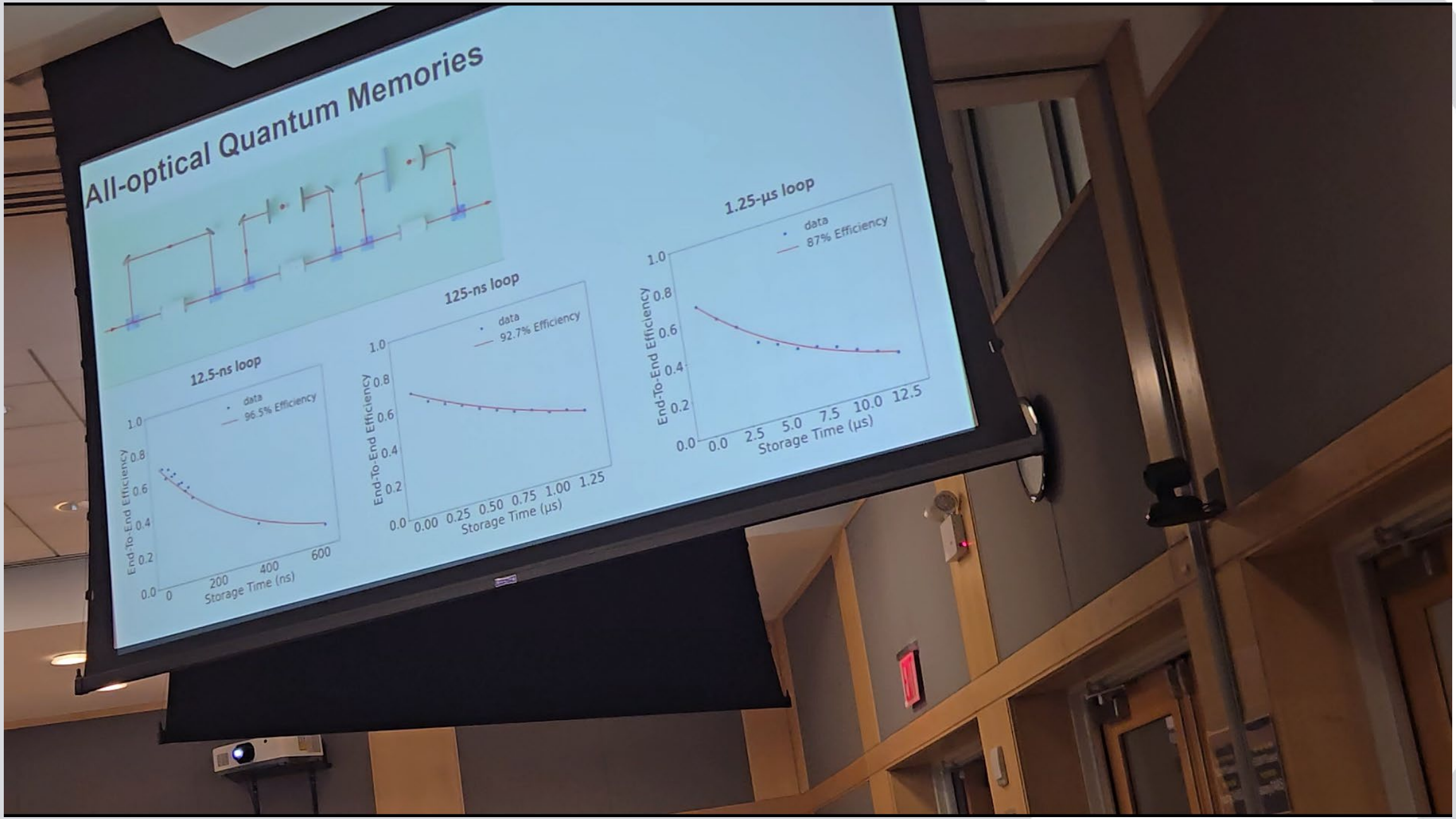
Challenges for quantum networks in existing network fiber plants.

- Distance limitations
- Fiber events
- Currently requires 4 fibers to operate(2 with multiplexing)
- Quantum repeaters are needed for long distances
- Challenges with aerial fiber and bridge fiber
- Cannot operate with existing optical amplification
- Off-the-shelf equipment is not yet available



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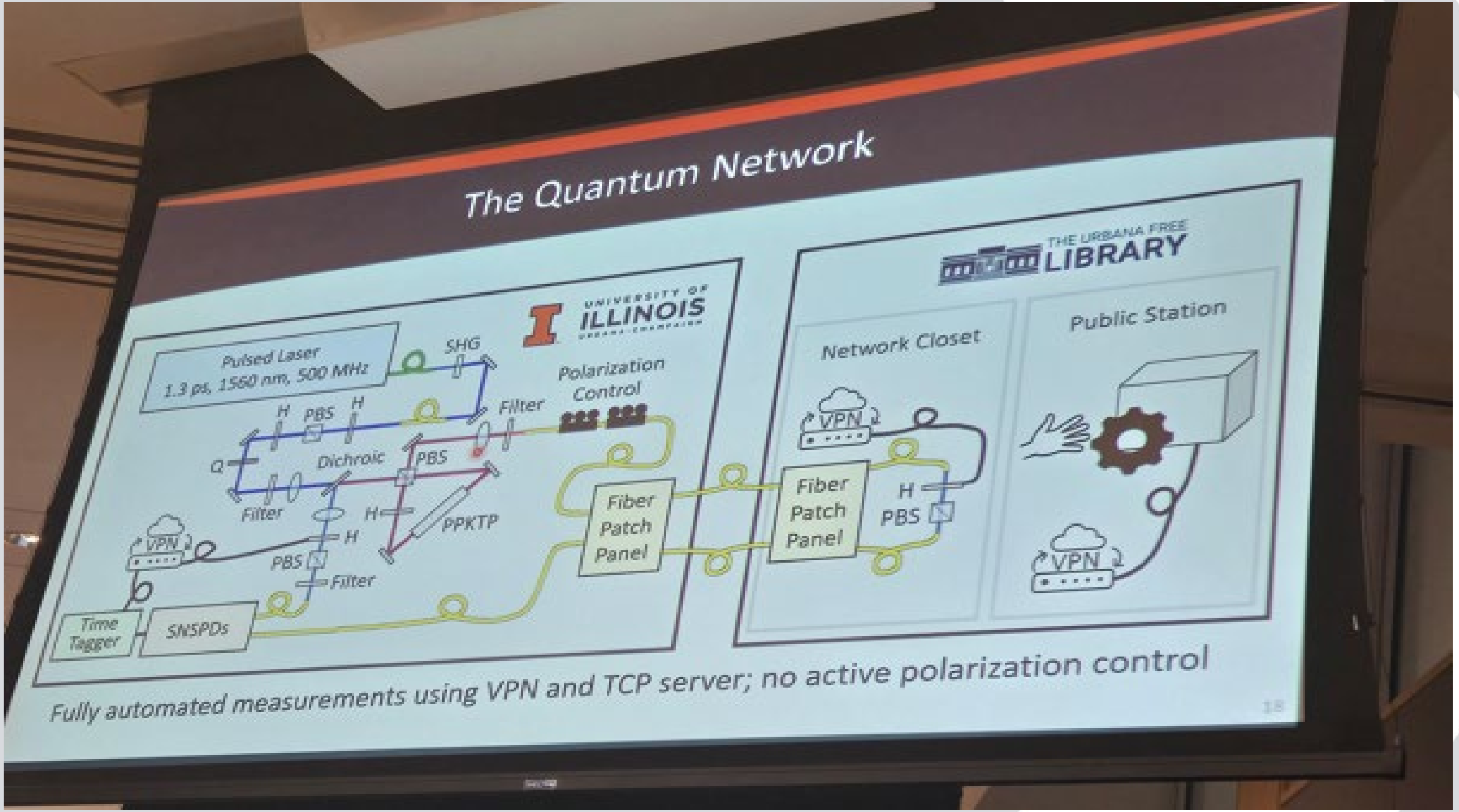
Quantum networks and education

On Saturday, November 4th, with more than 200 people in attendance, a team of researchers from The Grainger College of Engineering at the University of Illinois launched the first public quantum network in the entire world at one of our own public libraries. The launch event at The Urbana Free Library drew people of all ages to learn about this groundbreaking scientific achievement, and participate in hands-on demonstrations of just how something like this works. They were able to show that there is an actual quantum link between the lab at Loomis Laboratory of Physics on campus, and the library.

Gina Lorenz

Anyone can visit the quantum network display at The Urbana Free Library. You'll find it on the main floor, just across from the elevators. You can learn more about this research at Grainger's Illinois Quantum Information Science and Technology Center website, or explore these sites that are meant for kids and/or non-experts:



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Quantum's future in Missouri.

- Due to limitations in distance and equipment availability, quantum technologies will first be deployed at a local level and then expand to a regional level.
- MOREnet and the Great Plains Network (GPN) are working together to prepare for connecting future quantum networks between Illinois and Kansas.

Questions?

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Contact me at woodsjoh@more.net
for additional information.