Integrating quantum optics and photon sources for fibre and satellite communications

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CEO, Aegiq

EPIC World Photonics Technology Summit
24 Jan 2022

About us

Dec 2019
Aegiq spun-out from the University of Sheffield

July 2020
Awarded QComms Hub project to develop iSPS® based on novel colour centres.

June 2021
Graduated from Creative Destruction Lab – Quantum Stream.

Oct 2021
Awarded the prestigious Start-up Award 2021 from the Institute of Physics.

June 2020
Innovate UK funding to develop iSPS® based satellite QKD payload demonstrator as part of *'Next Generation Satellite QKD'*

August 2020
Innovate UK funding to participate at *'QT Assemble: Integrated Quantum Technology Programme'*
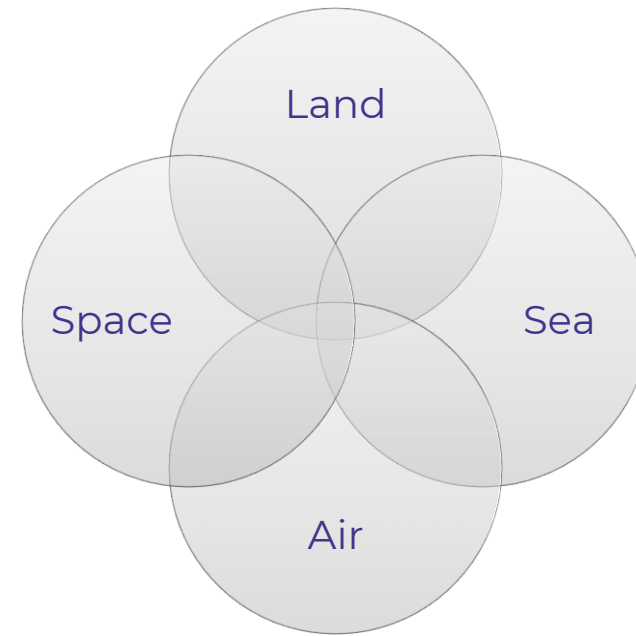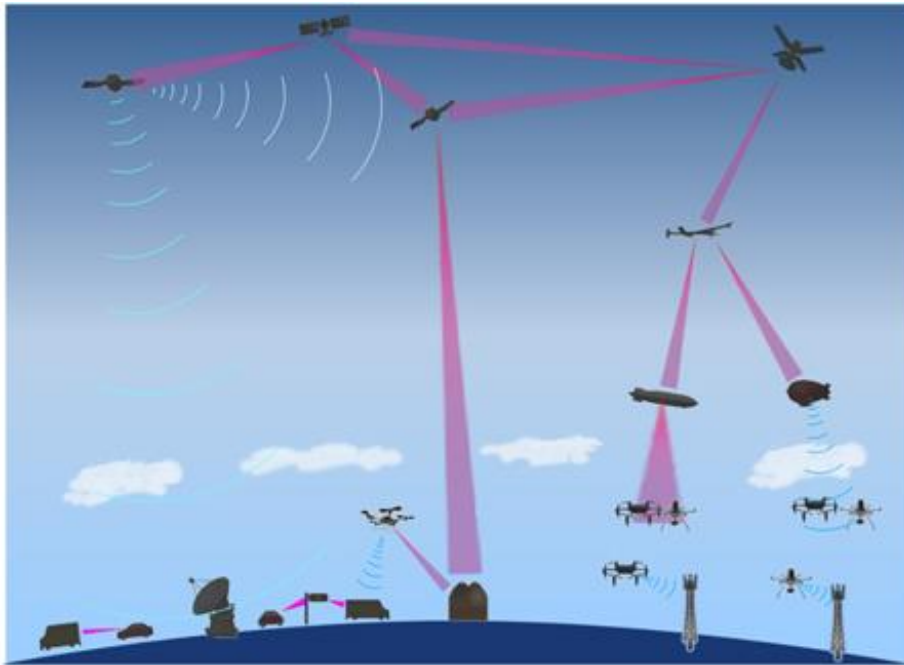
July 2021
Awarded in Innovate UK funding to co-develop integrated optics for quantum information
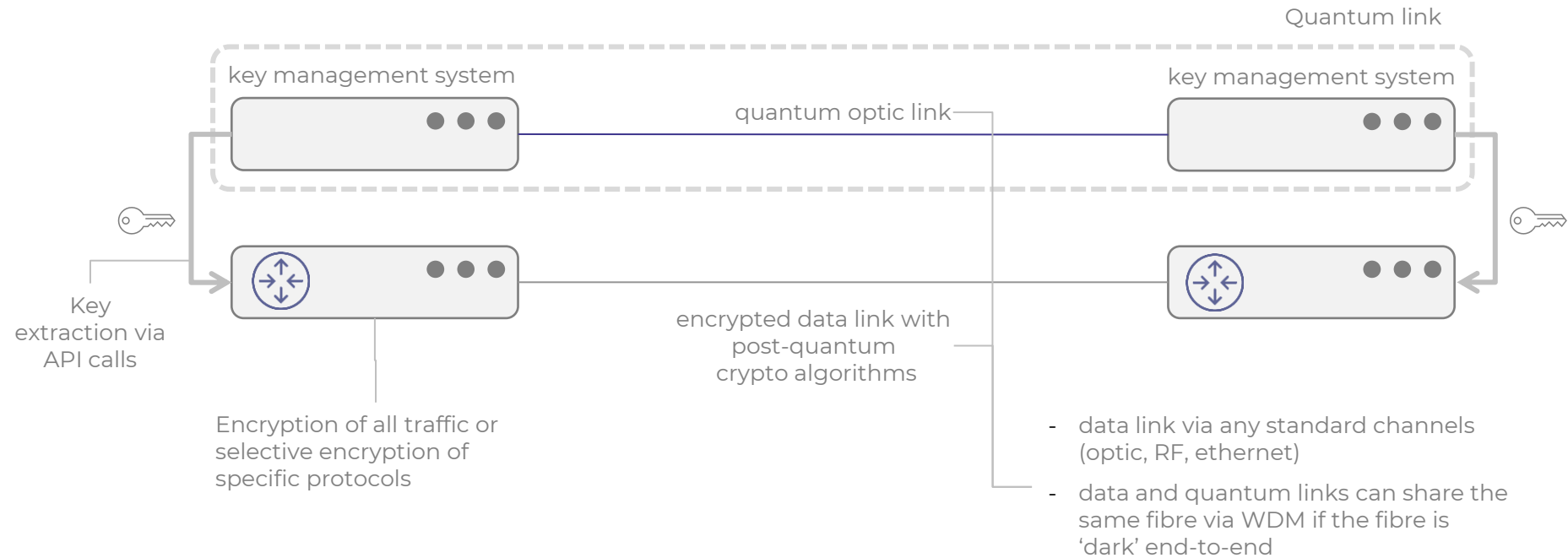
Jan 2022
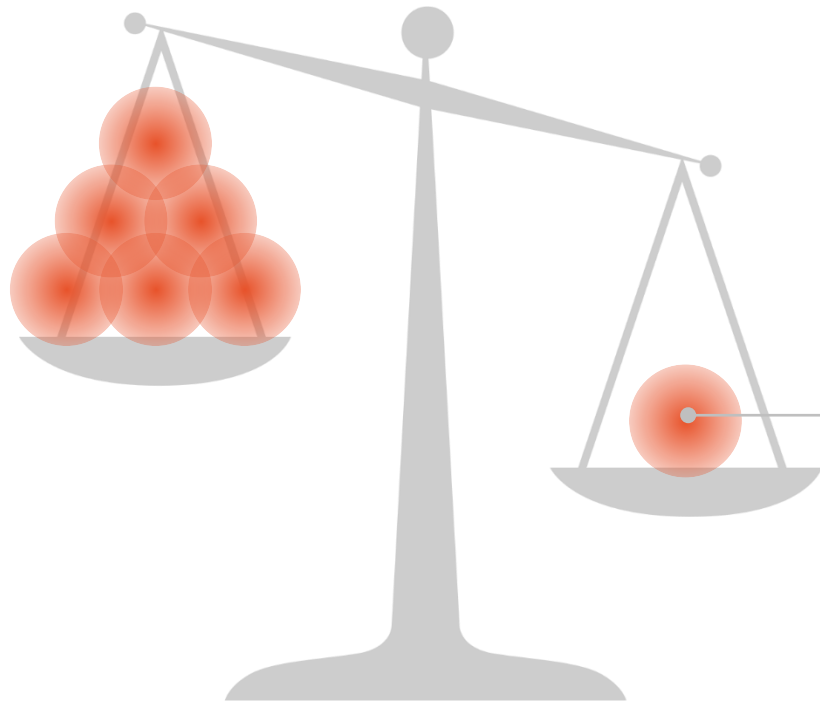Closed a 7-figure seed round to deliver iSPS®-based quantum information technology to market.

A platform to provide quantum connectivity everywhere?

# Quantum links – Quantum Key Distribution example

Quantum link

key management system

key management system

quantum optic link

Key extraction via API calls

Encryption of all traffic or selective encryption of specific protocols

encrypted data link with post-quantum crypto algorithms

- data link via any standard channels (optic, RF, ethernet)

- data and quantum links can share the same fibre via WDM if the fibre is 'dark' end-to-end

Less is more – single deterministic photons (iSPS®) for truly quantum applications

Deterministic
Definitely one photon per trigger
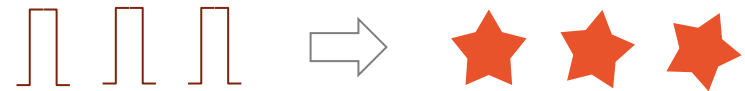
Indistinguishable / identical
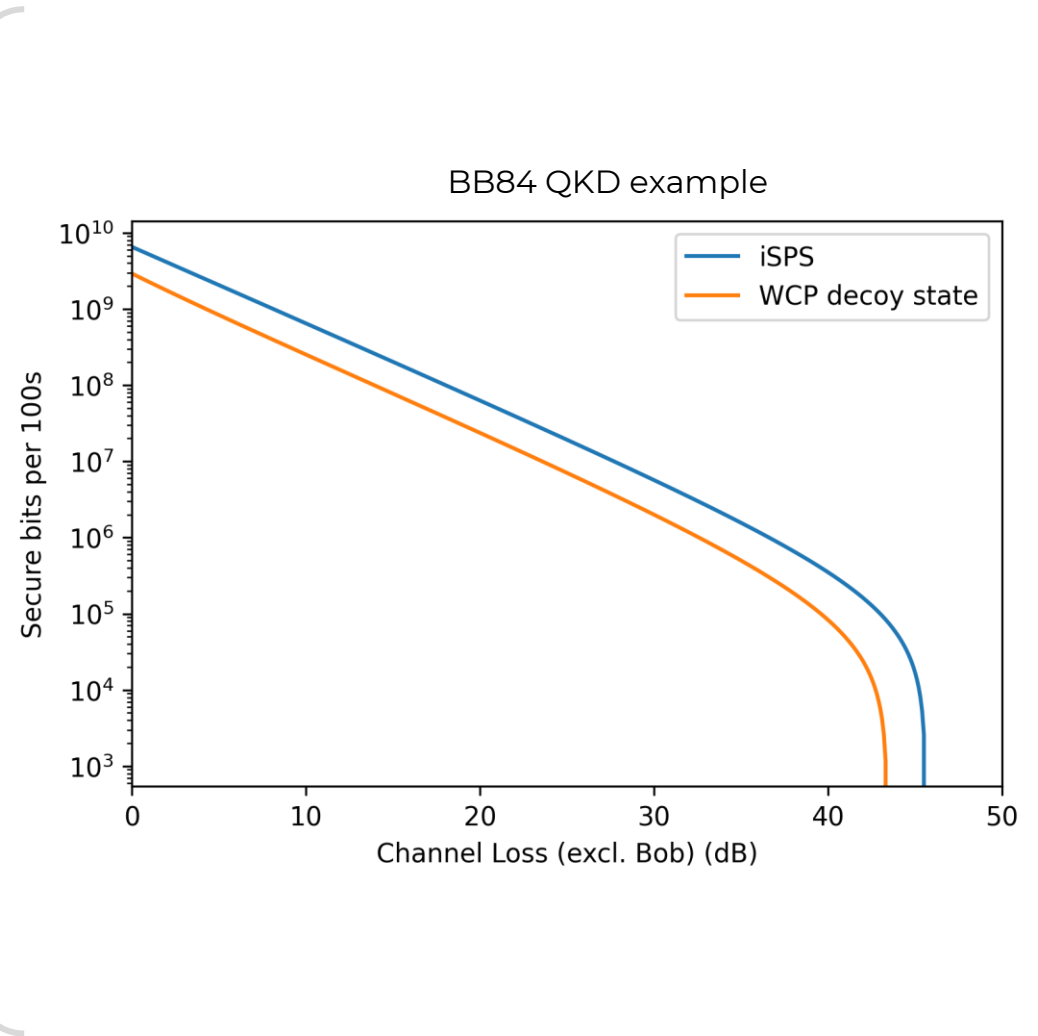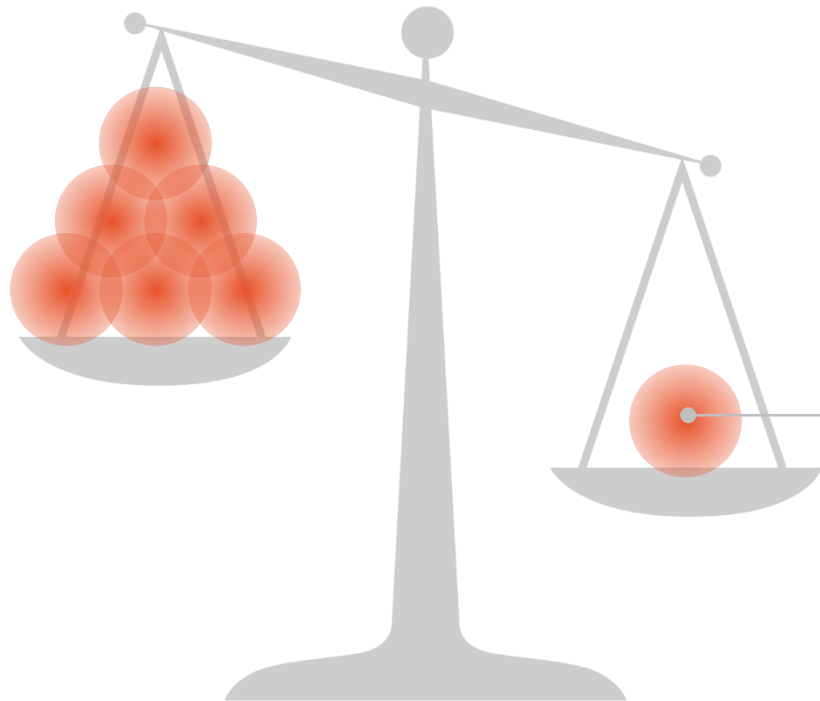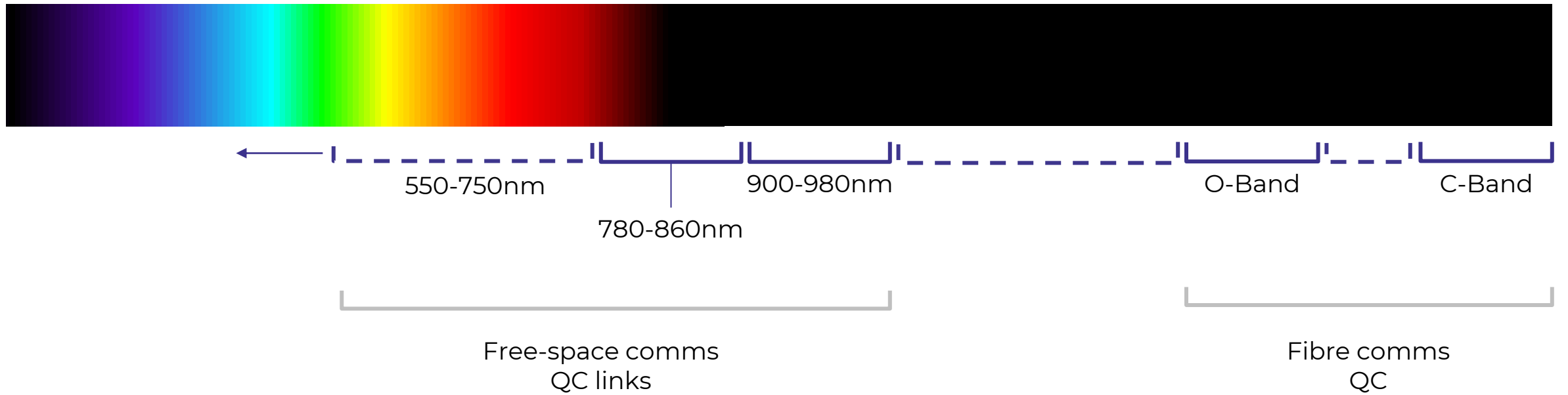No physical way to tell the difference between emitted photons
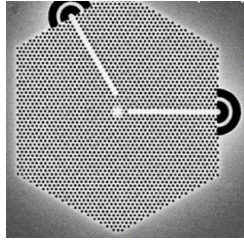
High-purity
Always just one photon and nothing else

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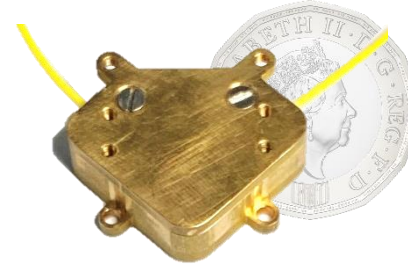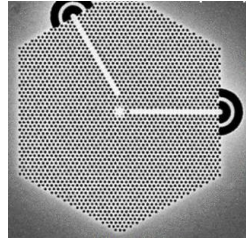# Less is more – single deterministic photons for better quantum communication links

BB84 QKD example

Plot axes: Secure bits per 100s (y-axis, 10^3 to 10^{10}) vs Channel Loss (excl. Bob) (dB) (x-axis, 0 to 50). Legend: iSPS, WCP decoy state.

Our spectrum

550-750nm

780-860nm

900-980nm

O-Band

C-Band

Free-space comms
QC links

Fibre comms
QC

Challenges

Challenges

Temperature

300K
⬇ ⬆
4K

Vibration

5g .. 20g

Membranes

70nm .. 200nm
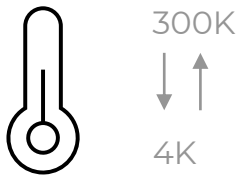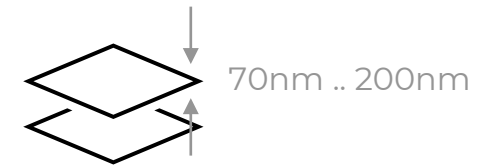
GAME OF LOSSES

Temperature

300K

4K

Vibration

5g .. 20g

Membranes

70nm .. 200nm

Challenges

✓ **Temperature**

300K
↓ ↑
4K

✓ **Vibration**

5g .. 20g

✓ **Membranes**

70nm .. 200nm
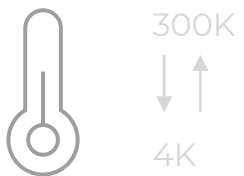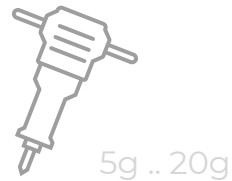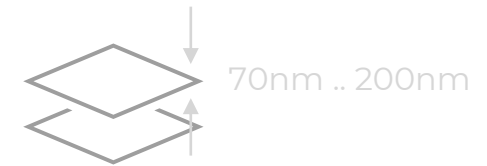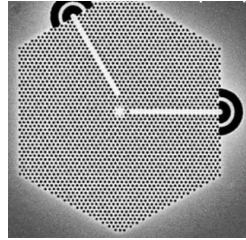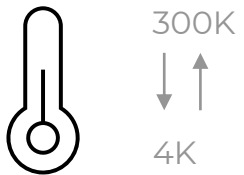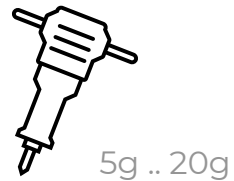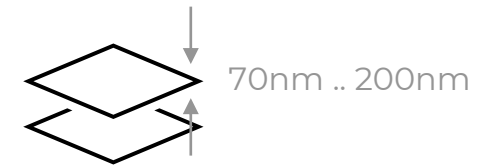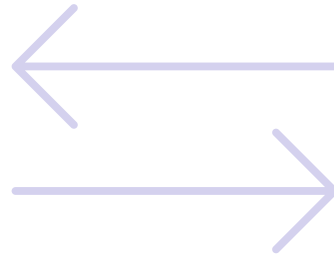
Let's do something awesome together!

We offer

Single-photon platform with flexibility to customise for multiple applications

We are looking for

- Partners to help us further develop manufacturing chain

- Users to try it out (metrology, calibration, computing, comms)