



#### SpooQy-1, A CubeSat to Demonstrate an Entangled Photon Light Source



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### Quantum Key Distribution



Quantum Key Distribution (**QKD**) is a technology that can distribute private encryption keys between two parties with strong security assurances underpinned by quantum mechanics.





### QKD in Space

#### Ground-based QKD

- Has limited range due to in-fibre attenuation and atmospheric loss
- Line-of-sight limitation

#### Space-based QKD

- Optical beam travels further in space (Only few tens of km of atmosphere)
- Large coverage
- Satellite is difficult to hack





[1] Reproduced from: Bedington et al., Progress in satellite quantum key distribution, npj Quantum Information 3 (2017)



## The Biggest Challenge Miniaturizing the Quantum Light Source!





### We use CubeSat

Centre for Quantum Technologies



#### Nano Satellite (cubesats) < 10kg







### Miniaturizing the Light Source







#### The Road Map







### First Space Attempt —— GomX-2



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### The Galassia Mission









#### The Road Map













### Quantum Light Source







#### The Road Map





### Satellite to Satellite QKD







Image Courtesy of UNSW Canberra, Australia





#### **Collaboration Welcomed**

- Optical terminals
- Fine pointing ADCS
- Optical beam steering
- High accuracy position knowledge



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# SPACE SYSTEMS