



EPIC Online Technology Meeting Quantum Computing

Tuesday 19th May



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Our Business

Design and manufacture affordable and compact ultrafast lasers that span the visible to Mid-IR.

Tunable



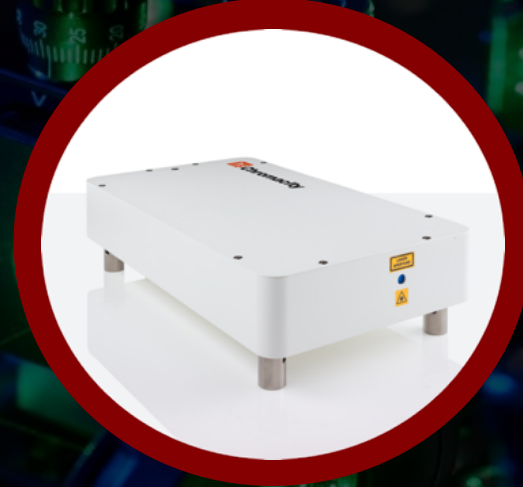
Mid-IR OPO

- Fundamental Research
- Spectroscopy (Molecular, Fingerprints and Complex Organic Compounds)

Near-IR OPO

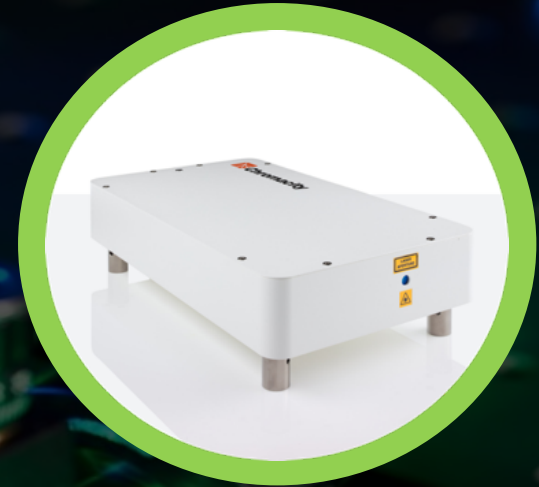
- Fundamental Research
- IR Spectroscopy
- LIDAR
- Telecoms
- Quantum Optics

Fixed



1040 nm

- Fundamental Research
- Microscopy (Two Photon, SHG)
- Pump Source for OPO and Non-Linear Optics

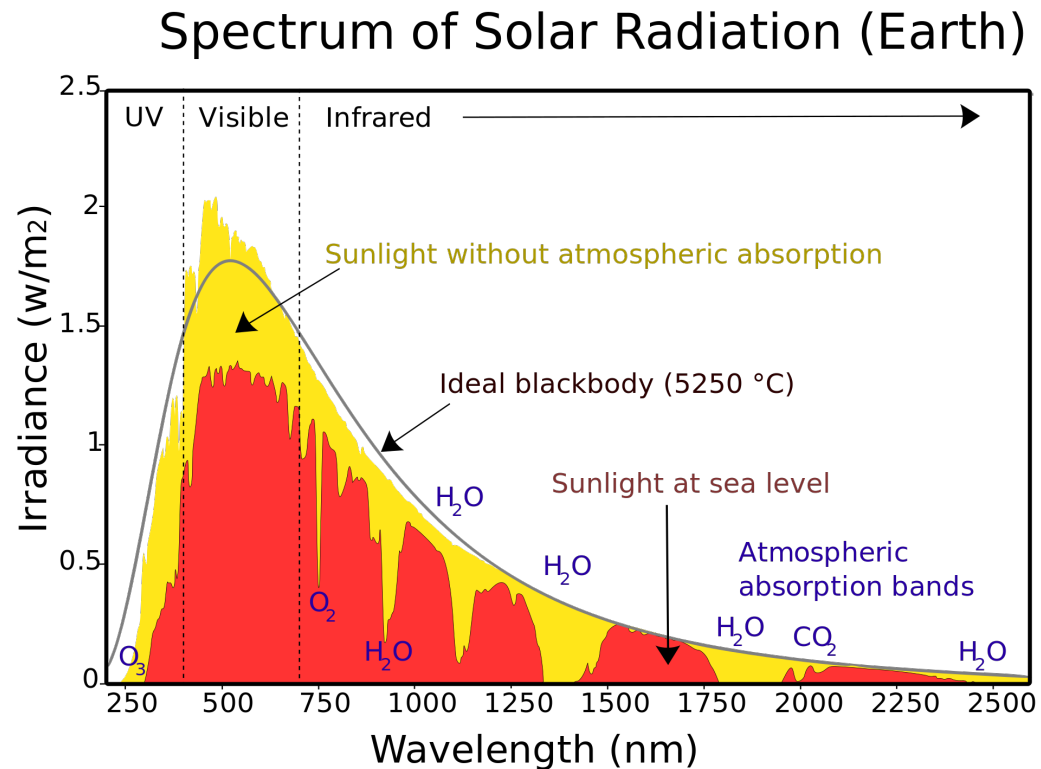


520 nm

- Fundamental Research
- Raman Spectroscopy
- Pump Source for OPO
- Quantum Optics

Quantum Key Distribution

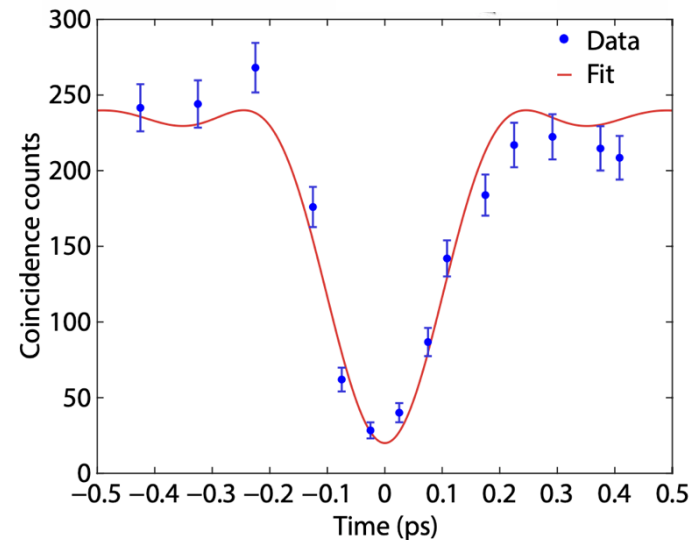
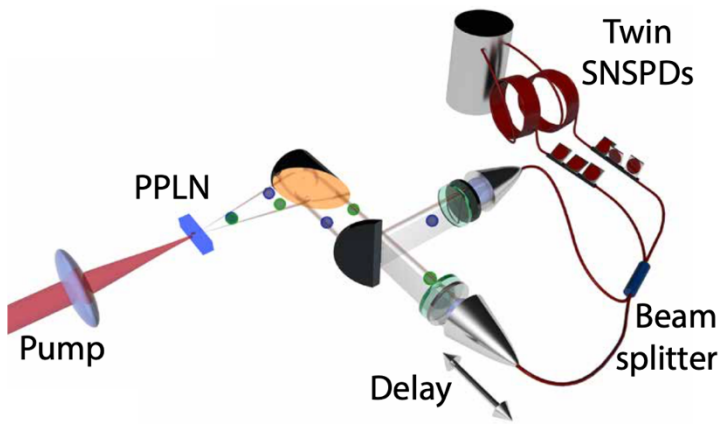
Generation and Detection of Down-converted Photon Pairs at 2.080 μm



- Ground-to-satellite quantum communications \sim atmospheric transparency window at 2 μm
- Solar blackbody radiation at telecom wavelengths reduced by half
- Free-space QKD \sim complications in implementing these systems in urban areas (higher concentration of aerosols, scatters shorter wavelengths)
- However there are challenges.....
- Polarisation maintaining fibers at 2 μm
- High efficiency single photon detectors at 2 μm

Quantum Key Distribution

Generation and Detection of Down-converted Photon Pairs at 2.080 μm



- Need to determine the quality of indistinguishability of the generated photons, by investigating two-photon interference using a Hong-Ou-Mandel (HOM) interferometer.
- Visibility of 88.1%, demonstrating photon indistinguishability via two-photon interference.
- This indistinguishability lies at the core of photonic quantum information processing.

Two-photon quantum interference and entanglement at 2.1 μm , Shashi Prabhakar et al. *Science Advances* Vol 6 No.13 eaay5195, March 2020



Thank You

LASER
APERTURE



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