Science & Technology Facilities Council
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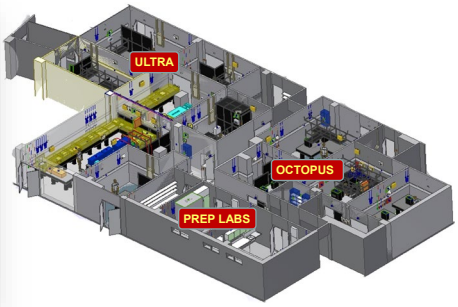
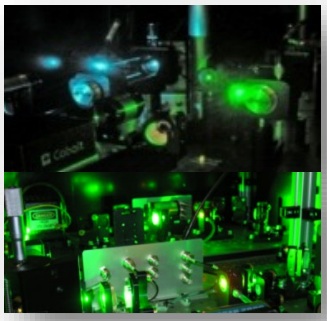
Research Complex at Harwell

Central Laser Facility
Octopus and *Ultra* Facilities





The Central Laser Facility (CLF) supports users from academia and industry in the areas of imaging (the *Octopus* facility, p2) and ultrafast spectroscopy (the *Ultra* facility, p3).

- Two calls for access per year
- Access typically 1 – 4 weeks
- 100 weeks / year (*Octopus*), 60 weeks / year (*Ultra*)
- Applications peer reviewed by academic access panel
- Successful applications are free at the point of access and supported with travel, accommodation and subsistence in the UK

Details on applying for access can be found here:
https://www.clf.stfc.ac.uk/Pages/Access-to-Octopus-and-Ultra.aspx

Octopus and *Ultra* are housed in the Research Complex at Harwell (RCaH).

The CLF is an STFC funded organisation that supports UK academic science and industry with specialised lasers and instrumentation. The CLF is co-located with UK's international synchrotron radiation and neutron facilities, Diamond Light Source and ISIS, at the Rutherford Appleton Laboratory (RAL) on the Harwell Campus.

CLF central laser facility

UK Research and Innovation

Science & Technology Facilities Council

MRC Medical Research Council

BBSRC bioscience for the future

EPSRC Engineering and Physical Sciences Research Council

NERC SCIENCE OF THE ENVIRONMENT

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OCTOPUS

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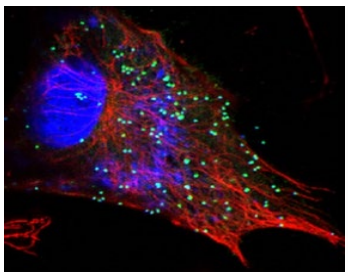
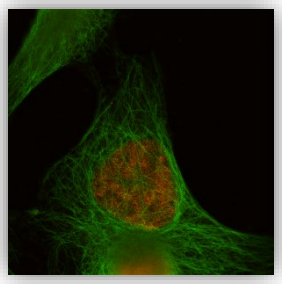
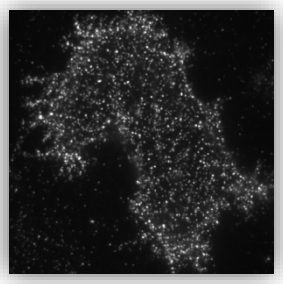
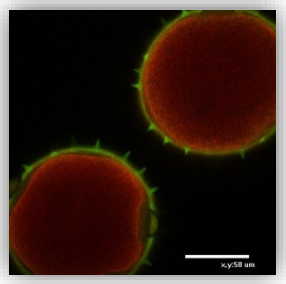
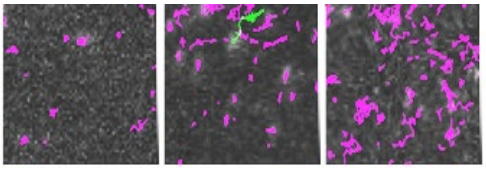
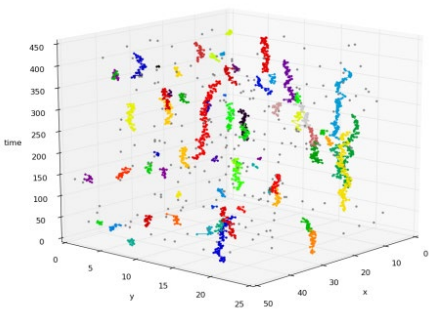





Octopus is a national user facility specialising in supporting UK science and industry with bio-imaging techniques

The Octopus facility supports and develops the latest microscopy techniques to enable successful applicants to perform complex studies in the areas of biological, chemical, environmental and materials science.





Super Resolution Microscopy

STORM/PALM 20 nm max xy resolution	Bruker Vutara SR-350. Max 0.5 Hz. Simultaneous two-colour 3D (biplane) imaging	405, 488, 561, 642, 750 nm
	Zeiss Elyra PS1. Low speed. Sequential three-colour 3D (phase ramp) imaging	405, 488, 561, 642 nm
Cryo-STORM 20 nm max xy resolution	FEI CorrSight & custom built microscope with cryo stage	
Structured illumination 100 nm max xy resolution	Zeiss Elyra PS1. Any dye, low phototoxicity. Sequential three-colour imaging. z-stacks	
STED 50 nm max xy resolution	Leica SP8, 592/775 nm depletion, FLIM, FCS	470-680 nm

Light Sheet Microscopy

Light sheet microscopy Up to 100 frames/s x,y diffraction limited; z up to 0.86 µm	Leica TCS SP8 DLS; fast 3D reconstruction of µm-mm translucent samples; in-situ fluorescence imaging; sequential multi-colour detection	470-670 nm

TIRF/Single Molecule Techniques

TIRF	Single molecule tracking Single pair FRET Nanometre separation Stoichiometry Single molecule polarisation	405, 488, 532, 561, 642 nm

Optical Trapping

Optical Tweezers Aerosol Trapping	Force Measurement Raman Spectroscopy Mie Scattering Spectroscopy Confocal Microscopy FLIM/PLIM TIRF Multi-colour	Wavelengths for trapping and Raman 488 nm, 514 nm 532 nm 700 – 900 nm 1064 nm, 1090 nm

Lifetime Imaging

Confocal Multiphoton Widefield	Fluorescence FLIM 25 ps-50 ns Phosphorescence PLIM 100 ns-ms Multi-colour 2-16 channels Multi-wavelength excitation	Wavelengths 405nm, 488 nm, 543, 561 nm Fianium, NKT 550 – 980 nm 76MHz, 200fs

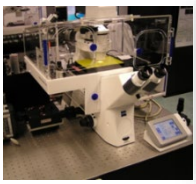
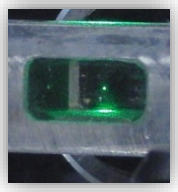
Successful applications are given full support from a team of experienced professional scientists whose sole aim is to deliver high quality and high impact results on every project

A comprehensive range of laser-based imaging techniques and sample handling are supported

Suite of cutting edge, complimentary bio-imaging techniques

Animal cell culture facilities

Advanced, bespoke image analysis

Chemistry and biological prep labs

Interdisciplinary operations team

Access to simulation /modelling expertise for interpretation

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ULTRA

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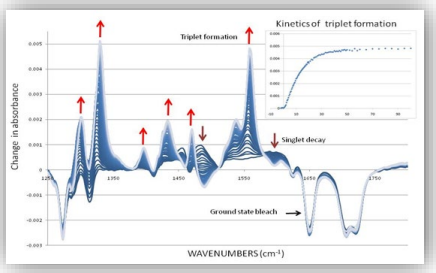
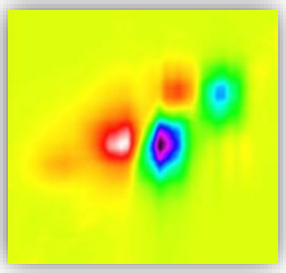
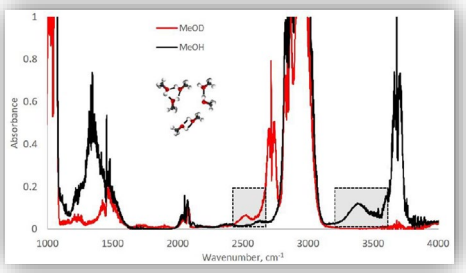
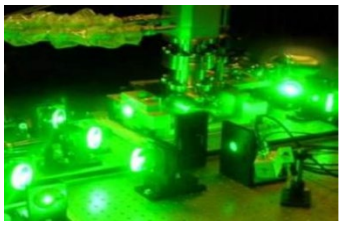


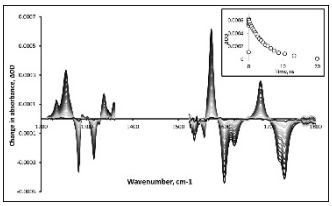




Ultra is a national user facility specialising in supporting UK science and industry with ultrafast laser spectroscopy



The Ultra facility hosts three unique laser systems, supporting a variety of complementary ultrafast measurements



Ultra A (Ti:Sapphire)

- 1: 10 kHz, 50 fs, 10W → fs OPA x 2
- seed
- 2: 10 kHz, 1-2 ps, 10W → ps OPA x 2
- seed
- 3: 1 kHz, 100 fs, 5W → fs OPA

- 1: TR-IR, 2D-IR
- 2: Kerr gated Raman, TR^3
- 1+3: fs-ms TR-IR, fs-ms TA, TR-2D-IR
- 1+2: TR-FSRS, EVV

Ultra B (Ti:Sapphire)

10 kHz, 50 fs, 20W → fs OPA x 3 → pulse shaper → 2D-IR; TR-2D-IR; IR-Vis-SFG

LIFEtime (Yb:KGW)

100 kHz, 200 fs, 6W → fs OPA x 2 probe → fs-ms TR-IR

seed

100 kHz, 300 fs, 15W → fs OPA x 1 pump → pulse shaper → 2D-IR; EVV

A comprehensive range of spectrometers, detectors and sample handling are supported

- *Multiple probe colours (UV – MIR)*
- *Multiple probe pulses spanning fs-s delay range in a single measurement*
- *Interferometry*
- *Infrared pulse shaping*
- *Broad bandwidth IR probing (500 cm^{-1})*
- *256 MCT element probe detection + referencing @ 1 – 100 kHz*
- *High sensitivity spectroscopy CCD*
- *In-house data acquisition and processing software*
- *Surfaces, liquids, solids and gases*
- *Temperature control, 10 - 600 K*
- *Sample cells for continuous liquid flow, rapid mixing and low volumes*
- *Labs and support for sample preparation*

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