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Development of non-linear microscopy infrastructure

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Abstract content (Max 300 words) Formatting & Special chars

The components of a versatile multimodal non-linear microscopy setup have been developed and an integrated construction has been designed. The various critical components in this setup are discussed and elements are characterised. These include for the excitation: A coherent super continuum light source generated in a photonic crystal fibre pumped by a femtosecond laser, a 4f pulse shaper with programmable spatial light modulator for dynamic pulse compression of the super continuum and pulse manipulation, the Multiphoton Intra-pulse Interference Phase Scan (MIIPS) compression algorithm; For sample management an optical tweezer and basic imaging facility; For imaging a fluorescence detection and confocal setup with scanning facility.

Specific detail of the high intensity probe created through compression of the super continuum through phase correction using a spatial light modulator is presented. The characteristics of the pulses regarding spectral bandwidth and polarisation dependence on input pulse power, the phase and amplitude of the compressed pulses are presented. The MIIPS algorithm is described and evaluated. The details of the tweezer setup are presented and results from the instruments are discussed. A fluorescence microscope has been integrated into the system and the layout and functioning of this setup is also discussed.

The spectral imaging facility is presented and future plans for further development of the setup are alluded to.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

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