MULTIDIMENSIONAL IMAGING AND SPECTROSCOPY OF DIAMOND PHOTOLUMINESCENCE

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Brief project description and student requirements
This PhD project aims to develop and apply photonics technology for time resolved luminescence studies, including fluorescence lifetime imaging (FLIM) microscopy and spectroscopy using tunable supercontinuum sources, femtosecond Ti:Sapphire lasers and "two colour-two photon" nonlinear excitation below 340 nm, i.e. near and above the bandgap. Characterising the spectro-temporal properties of diamond photoluminescence and mapping these properties to correlate them with structural images, including super-resolved images from our STED microscope, could provide new means to contrast different types and states of diamond for:

(a) contrasting different forms of diamond including natural and synthetic gemstones, monocrystalline and polycrystalline diamond, bulk diamond and nanodiamond

(b) studying diamond materials that have experienced different levels of stress

(c) studying emission properties of nanodiamonds for potential biomedical imaging applications

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