fs broadband FLuorescence UPconversion Spectroscopy (FLUPS): Spectral coverage versus efficiency

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Sum frequency mixing of fluorescence and ~1300 nm gate pulses, in a thin β-barium borate crystal and non-collinear type II geometry, is quantified as part of a femtosecond fluorimeter.[1-3] For a series of fixed phase matching angles, the upconversion efficiency is measured depending on fluorescence wavelength. Two useful orientations of the crystal are related by rotation around the surface normal. Orientation A has higher efficiency (factor ~3) compared to B at the cost of some loss of spectral coverage for a given crystal angle. It should be used when subtle changes of an otherwise stationary emission band are to be monitored. With orientation B, the fluorescence range λ_F = 420-750 nm is covered with a single setting of the crystal and less gate scatter. The accuracy of determining an instantaneous emission band shape is demonstrated by comparing results from two laboratories.

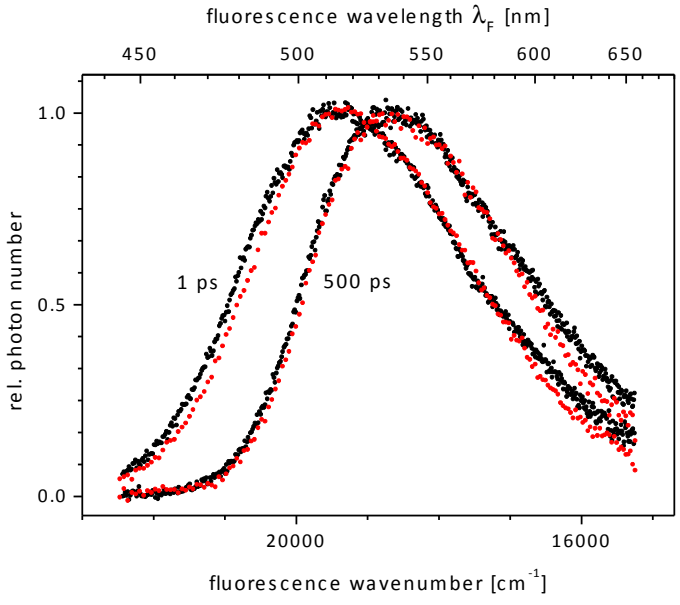

Figure 1. Instantaneous emission of Coumarin 153 in dimethyl-sulfoxide measured and corrected in Berlin and Geneva using orientation B. Shown are photon distributions over fluorescence wavenumber normalized at the peak.

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