

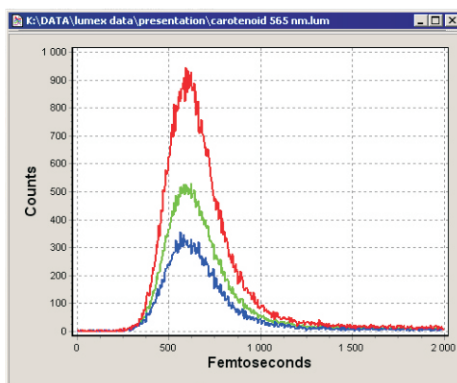
# Beacon

## Femtosecond Fluorescence Upconversion System



### Key Features

Femtosecond optical gating (FOG) method gives best temporal resolution in light-induced fluorescence lifetime measurements. The resolution is determined by a temporal width of femtosecond optical gate pulse and doesn't depend on the detector response function. Sum frequency generation (also called upconversion) in nonlinear optical crystal is used as a gating method in the Beacon femtosecond fluorescence kinetic measurement system. We offer **Beacon-DX** for operation together with Ti: sapphire femtosecond oscillators and **Beacon-DA** for operation together with femtosecond amplified pulses.



Fast rise and decay of very weak fluorescence measured with Beacon-DX in the carotenoid band (565 nm) of xanthorhodopsin after the excitation at 420 nm. Kinetics for parallel, perpendicular and magic angle fluorescence detection are shown.

Fluorescence kinetics measurements in solutions, solid state samples, vapor cells and thin films

Transmission and reflection configurations of fluorescence collection

Fluorescence collection with lenses or off-axis parabolic mirrors

Optimized configurations for fluorescence detection with < 150 fs temporal resolution

Double monochromator

> 10<sup>4</sup> fluorescence detection dynamic range

Fluorescence anisotropy measurements

Low temperature measurements (option)

Analog / digital sum frequency signal detection (Beacon-DA)

Photon counting detection Beacon-DX)

Built-in second harmonic generator (Beacon-DX)

UV fluorescence excitation with CDP 2015 third harmonic generator

Fluorescence excitation with optical parametric amplifiers (Beacon-DA). TOPAS or CDP 2017 are recommended

## Beacon Configuration

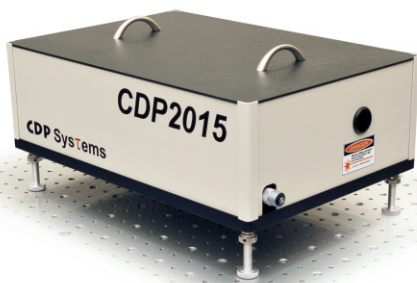
Beacon is a complete fluorescence kinetic measurement system. It contains an optical unit, a double monochromator, a PMT detector, an electronic control unit and Lumex 5.0 data acquisition software. Installation, personnel training and test measurements are always included.

The optical unit contains installed on a breadboard all mechanics and optics for gate and excitation pulses, an optical delay line, a sample assembly and optics for anisotropy measurements.

The optical unit contains built-in frequency doubler for the sample excitation with second harmonic of a femtosecond Ti: sapphire oscillator (model Beacon-DX).

Photon counting or combined analog / digital electronics is used for detection of upconversion signal with high S/N ratio in the Beacon-DX and Beacon-DA, respectively.

Optional CDP 2015 frequency conversion unit is used to get third harmonic (Beacon-DX) or second and third harmonics (Beacon-DA) of a femtosecond Ti: sapphire oscillator and amplifier, respectively.



## Fields of Application

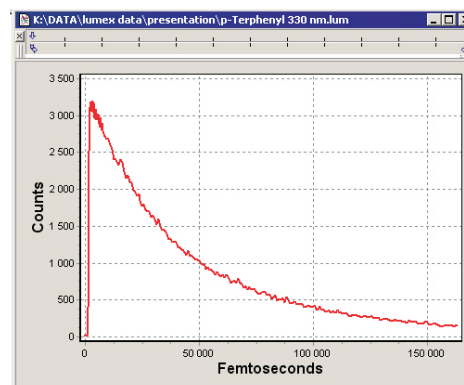
- Photochemistry
- Molecular Spectroscopy
  - Nanophotonics
- Solid State Physics
  - Biophysics
- Material Science

## Specifications

- Fluorescence detection spectral range: 310 nm - 1600 nm (depends on the excitation wavelength)
- Input pulse repetition rate: 1-10 kHz (Model DA), 100 kHz -100 MHz (DX)
- Dark counts of the photon counting system: < 5 cps at room temperature (Model DX)
- Monochromator: 160-mm double monochromator, model CDP 2022D
- Maximum optical delay between gate and excitation pulses: 2.0 ns (4.0 ns in the optional double-pass configuration)
- Minimum step of the delay line: 0.78 fs (1.56 fs in the optional double-pass configuration)

## Dimensions

- Beacon-DX: 900 mm x 440 mm x 205 mm
- Beacon-DA: 700 mm x 520 mm x 205 mm
- CDP 2022D: 435 mm x 130 mm x 240 mm
- CDP 2015-DX: 440 mm x 300 mm x 180 mm
- CDP 2015-DA: 460 mm x 320 mm x 180 mm



Fluorescence kinetics recorded at 330 nm in the solution of p-Terphenyl after the excitation at 267 nm with CDP 2015 frequency conversion unit.