

## **Visualizing dynamic processes with rapidFLIM<sup>HiRes</sup>, the ultra fast FLIM imaging method with outstanding 10ps time resolution**

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Fluorescence Lifetime Imaging (FLIM) has become an essential tool in Life Sciences over the last decade. However, up to now, users had to choose between high timing precision or fast data acquisition when using Time-Correlated Single Photon Counting (TCSPC) electronics. This was a drawback when investigating fast processes in cells or tissues such as protein interactions, FRET dynamics, chemical reactions or even fast moving species.

We report here on an approach named rapidFLIM<sup>HiRes</sup>, that allows recording several FLIM images per second with an outstanding temporal resolution of 10 ps. This method combines the latest advances in fast scanning, hybrid photomultiplier detectors, which are capable of handling very high count rates, TCSPC modules with ultra short dead times and time bin widths as small as 10 ps, as well as correction algorithms to reduce decay curve distortions due to very high count rates and artifacts of the detector pulse pile-up.

With this combination, excellent photon statistics can be achieved in significantly shorter time spans, allowing observing fast processes with the high optical and temporal resolution achievable in confocal microscopy. Depending on image size, rapidFLIM<sup>HiRes</sup> allows imaging at a rate of several frames per second and allows quantitative data analysis even at count rates much higher than 50 Mcps. The capabilities of this method will be highlighted by quantitatively analyzing FRET data obtained from fluorescent proteins in cells.