Title
Efficient FCS (fluctuation correlation spectroscopy) data acquisition card with digital frequency domain lifetime capabilities

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Abstract, Internal PDF

We developed a flexible data acquisition card that records time resolved photon events. The sequence of photon arrival is therefore available for analysis by any method(s), such as, but not limited to, autocorrelation, photon counting histogram, and higher order autocorrelation. The usual acquisition method for Fluctuation Correlation Spectroscopy (FCS) cards is the time mode, which measures the number of photon events per time interval. We have incorporated a new acquisition method, photon mode, which measures the number of time intervals between photon events. This new method matches the time resolution of the time mode which, for most experimental situations, is more efficient in terms of data transfer. The experimental regimes in which one mode is more advantageous than the other will be discussed. Our current card design allows for either time or photon mode data acquisition and is capable of 100 ns resolution. We also developed a simple addition to the card that performs digital frequency domain lifetime measurements. This enables us to perform lifetime and FCS measurements simultaneously.