LICENSING OPPORTUNITY: TEMPORAL JITTER ANALYZER AND ANALYZING TEMPORAL JITTER

DESCRIPTION

Problem

The method addresses the need to characterize single-photon detectors whose jitter is in the few-picosecond range.

Invention

This is a simple method to measure the jitter, or temporal variation, of a repeated event. The method is based on simple electronic circuitry and can achieve measurement resolution on the order of hundreds of femtoseconds.

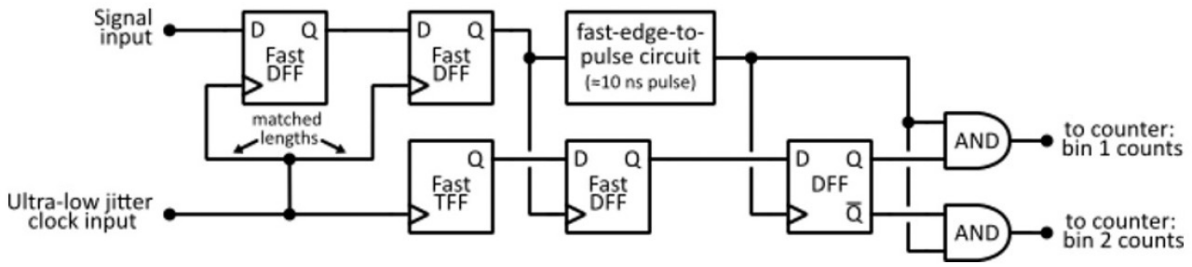
BENEFITS

Commercial Application

There are a variety of technologies and methodologies used for event timing. This measurement suggests that this method can provide better temporal resolution for characterizing the temporal distribution of repeated periodic events.

Competitive Advantage

The invention is a method to characterize the temporal variation, or "jitter," of a single-photon detector's response with high accuracy.



This circuit measures the timing jitter, or variation, in the arrival time of a repetitive electrical signal of interest, such as from the output of a single-photon detector under short-pulse illumination. An ultra-low jitter clock that is synchronous with the repetition rate of the input signal is slowly swept in time (by some external means of phase delay) with respect to the input signal. As a clock edge is swept through the arrival time of the signal edge, counts in two bins are recorded, one bin recording instances when the signal arrived before the clock edge, and the other bin recording instances when the signal arrived after the clock edge. The operation of this circuit can be understood as conceptually similar to a knife edge used to measure an optical beam's spatial profile, except in the time domain. For example, an input signal with a gaussian jitter distribution will result in two sigmoidal shapes whose widths represent the temporal jitter of the input signal with respect to the clock. Using this method, the resolution can be below 1 ps with commercial hardware.

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