Frequently Asked Questions

General

Lasers, Laser Drivers

TCSPC Devices

Detectors

MicroTime 200

Why do I not get the same count rates on both SPAD detectors?

In this article we assume that both detectors are SPADs of the same kind (both Excelitas SPADs, or both PDM-SPADs, or both tau-SPADs).

If you are using either a **proper** (see below) 50/50 beamsplitter to split the signal between two detectors or a 100% mirror to direct the signal to one detector and then the other, but still observe very different count rates on the two detectors, this discrepancy could be due to the following reasons:

1. Misalignment of the Lens in Front of the SPAD:

The lens alignment in front of the SPAD may be incorrect. Typically, the detector mounted in reflection requires adjustment because beamsplitters might not all have exactly the same angle. Solution: Follow the “Everyday Alignment” Procedure from the MicroTime 200 manual to correctly align the lens. It might be that also “Fundamental Alignment” is necessary.

2. Beamsplitter Variability:

PicoQuant offers different types of beamsplitters:

- simple 50/50 splitters that are delivered with each beamsplitter tower **→ These split rather 30/70, also depending on wavelength and polarization**
- 50/50 cube (nonpolarizing) **→ Should split 50/50**
- 50/50 cube (polarization splitting) **→ Split 50/50 ONLY for randomly polarized signals**
- 50/50 plate (labeled “50/50, 400 - 1000 nm”) **→ Should split 50/50**

Solution: To determine whether the misalignment or the splitter itself is causing the discrepancies, you can perform the following test:

Test Procedure:

1. Use a concentrated dye solution and ensure the same emission filter is mounted in front of each detector, or place the emission filter before the splitter (holder before the pinhole).
2. Direct all light to Detector 1 and record the count rate (the count rate should be between 100 kcps and

700 kcps - **adjust the laser power accordingly**).

3. Use a 100% mirror to redirect all light to Detector 2 and record the count rate.
4. Compare the count rates of Detector 1 and Detector 2. If the detectors are of the same type, similar count rates are expected.
    - If the count rate difference is more than 10%, the alignment on the detector with the lower countrate should be checked and maximized.
        - Follow the “Everyday Alignment” Procedure from the MicroTime 200 manual to correctly align the lens. It might be that also “Fundamental Alignment” is necessary.
5. Introduce the beamsplitter and measure the combined count rate from both detectors.
    - The sum of the signal on both detectors should be the same as from the previous measurement (i.e. 100% going to Detector 1 or 2).
        - If it is not (again, allow for 10% error), check the alignment.

If you have followed these instructions, and the light is not split 50/50, then this is likely a property of the beamsplitter. Make sure that is it the correct kind of beamsplitter (see above), and/or contact us for advice.

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