T3R Antibunching - Slow Decay

Q.: How can we avoid decay at very long time delay (up to 5us)?

In this show-case the external preconditions are:

- detectors: perkin elmer SPCMAQR14

- 700 nm SP filter in front of one of the apds

- sample: diamond nanocrystals (100 nm), we are measuring the antibunching of the NV centers emission

- laser wavelength: 532 nm, cw

- T3R Measurement with PicoHarp Software

A.: The decay can be caused by blinking of the nanodiamonds.

A decay caused by correlation statistics

On top of an eventual blinking you will have a decay caused by correlation statistics.

This happens because you correlate the first arriving photon against a photon at the longer time,

which will be an increasingly unlikely event because the earliest stop photons always win and the experiment restarts.

I attached a simulation.

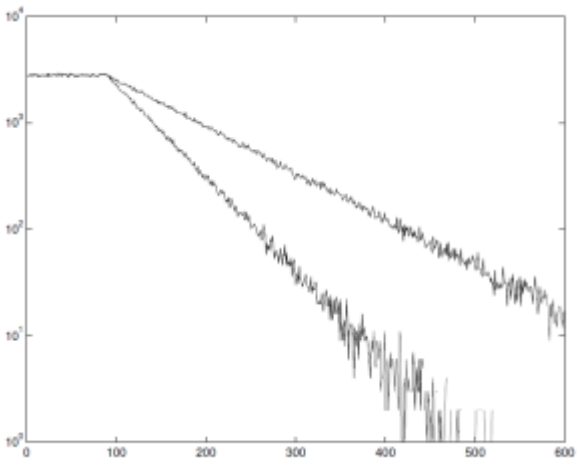

Fig. 1: Logfile logf.png

You will I need the raw data

The timescale is in ns. The plateau is the dead-time. The decay slope depends on the count rate.

You can zoom into your data and you will see roughly the same behavior - linear decay after the dead-time, which than of course is overshadowed by the background.

The way to avoid this is is to calculate the total correlation. This is not a start-stop correlation but the correlation of every photon against every photon.

It can be done measuring in T2 mode and then correlating using the SymPhoTime Software (http://www.picoquant.com/products/sw_mt/sw_mt.htm).

For a trial you will I need the raw data - a pt2 file containing all the photon data - not just the correlated curve. You can record this using the button I highlighted in the attached screenshot.

PicoQuant GmbH
Rudower Chaussee 29 (IGZ)
12489 Berlin
Germany

P +49-(0)30-1208820-89
F +49-(0)30-1208820-90
info@picoquant.com
www.picoquant.com