Purity (Hanbury Brown-Twiss Measurements)

To calculate the purity of a single-photon source from the second-order correlation function (g^(2)(0)) data obtained in a Hanbury Brown-Twiss (HBT) experiment, you can use the formula:
Purity = 1 - g^(2)(0)
Here's how to calculate the purity step by step:

Step 1: Obtain g^(2)(0) Value:

- In an HBT experiment, you measure the second-order correlation function g^(2)(0), which represents the probability of detecting two photons at the same time delay.

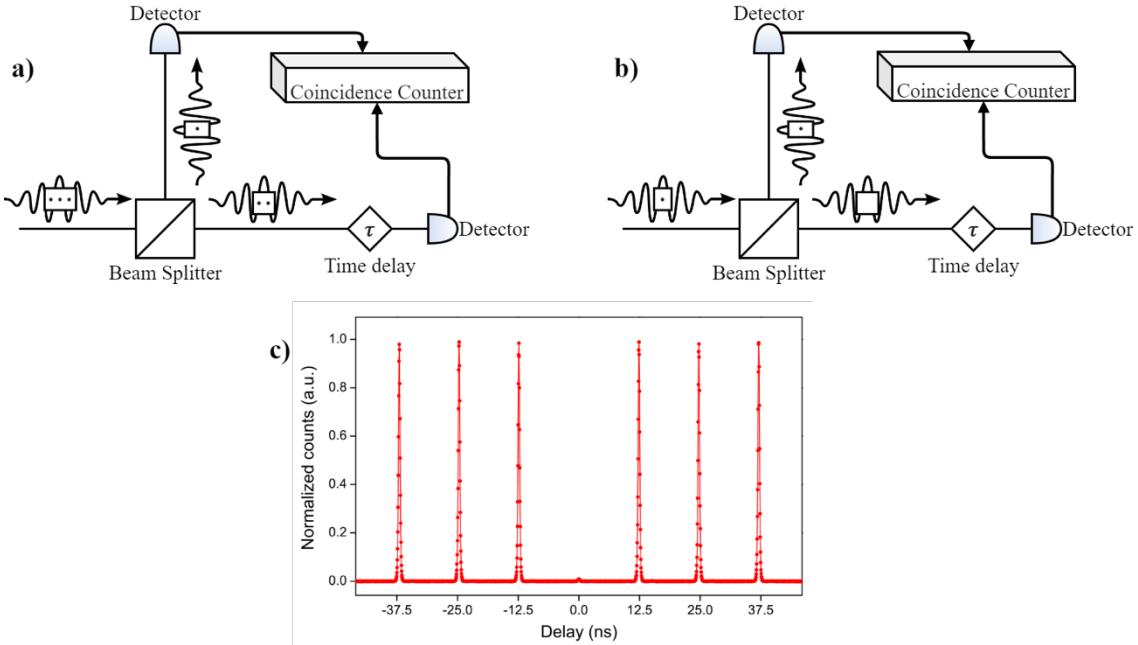
Step 2: Calculate Purity:

- Use the formula Purity = 1 - g^(2)(0).
- This formula calculates the purity of the single-photon source based on the g^(2)(0) value.

Step 3: Interpret the Purity Value:

- The calculated purity value will be between 0 and 1.
- A purity value of 1 indicates a perfect single-photon source (i.e., no multi-photon emission).
- As the purity value decreases from 1, it indicates increasing multi-photon emission, which is a measure of the quality of the single-photon source.

Step 4: The lower the purity value, the more multi-photon emissions are present, which can affect the quality of the single photons generated. A high-purity value (close to 1) is desirable for applications in quantum information processing, where true single photons are required.



$g^{(2)}(0)$: normalized coincidence count at the delay 0.