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Thesis: **"IMPLEMENTATION OF A PHOTON PAIRS SPECTRAL CHARACTERIZATION SYSTEM"**

Summary:

In this study, a comprehensive setup for the spectral characterization of photon pairs is presented, enabling the determination of the degree of correlation between them, with the purpose of studying the correlation between the frequencies of photon pairs generated by non-linear processes. The characterization system used consist of two Avalanche Photodiodes (APD), that count the number of photons that arrive, a IDQ800 that register the number of photons pairs that arrive in a window of time, and two monochromators that help to select the spectral components that arrive to the APDs. The intention of building the spectral characterization system is to measure the intriguing process of Counter-Propagation Four-Wave Mixing, where the theory gives a configuration in which the factorability of the state is always satisfied, and the phase-matching condition is consistently satisfied, due to technical problems this process could not be measured. The system was also calibrated with the Spontaneous Four-Wave Mixing Cross-Polarized case in a birefringence fiber model (HB800G). For this case, measurements of the spectral correlations were performed, which show a high correlation between the photon pair. Simulations of both cases of SFWM were made, in order to compare with the experimental measurements. For the Counter-Polarized process, the simulations have an excellent agreement with the experimental results and there is no factorizable state. However, for the Counter-Propagation one, there is a factorizable state.