HOM notes

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Contents

1 Introduction

First done in: [1], but the goal is [2]

2 Experimental setup

Has been used, as in [3, 4]:

- PicoQuant PDL 800-B $\lambda = 375\,\text{nm}$, $P_{max} = 2.5\,\text{mW}$, $f_0 = 40\,\text{MHz}$, its sync signal has been dumped by 6 dB
- PicoQuant HydraHarp 400 4-channel picosecond event timer, library version: 3.0 [5], CFD level = 610 mV, CFD zero cross = 10 mV with maximal time resolution of 1 ps
- Agilent 53132A Universal Counter 225 MHz $\times 2$ at 2.7 V threshold and inner resistance $50\,\Omega$
- FELH700 Thorlabs $\times 2$ - longpass filter at 700 nm
- LB-1494-AB Thorlabs $\times 2$ - bi-convex lens, f=12.0 mm
- LA-4380-AB Thorlabs - lense, f=100.3 mm, $(400 \div 1100)$ nm
- FBH370-40 Thorlabs - bandpass filter at 370 nm FWHM=40 nm
- F260SMA-B Thorlabs - fiber collimator
- BBO crystal $6 \times 6 \times 1$ $\theta = 29.2°$ $\varphi = 90°$ Eksma Optics
- Beam splitter 50:50 as HOM BS
- Beam splitter 30:70 for alignment at position of BBO

3 Experiment

4 Discussion and conclusion

5 Acknowledgments

References

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[2] Audrey Eshun et al. "Investigations of Molecular Optical Properties Using Quantum Light and Hong–Ou–Mandel Interferometry". In: *Journal of the American Chemical Society* 143.24 (June 23, 2021), pp. 9070–9081. ISSN: 0002-7863, 1520-5126. DOI: 10.1021/jacs.1c02514. URL: https://pubs.acs.org/doi/10.1021/jacs.1c02514 (visited on 09/16/2025).

[3] Jorge Carvioto-Lagos et al. "The Hong–Ou–Mandel interferometer in the undergraduate laboratory". In: *European Journal of Physics* 33.6 (Nov. 1, 2012), pp. 1843–1850. ISSN: 0143-0807, 1361-6404. DOI: 10.1088/0143-0807/33/6/1843. URL: https://iopscience.iop.org/article/10.1088/0143-0807/33/6/1843 (visited on 09/16/2025).

[4] P. J. Thomas et al. "The Hong–Ou–Mandel interferometer: A new procedure for alignment". In: *Review of Scientific Instruments* 80.3 (Mar. 1, 2009), p. 036101. ISSN: 0034-6748, 1089-7623. DOI: 10.1063/1.3080559. URL: https://pubs.aip.org/rsi/article/80/3/036101/351849/The-Hong-Ou-Mandel-interferometer-A-new-procedure (visited on 09/16/2025).

[5] PicoQuant GmbH. *HHLib Programming Library for Custom Software Development under Linux*. Mar. 2019. URL: https://github.com/PicoQuant/HH400-v3.x-Demos (visited on 09/16/2025).