

The Quantum Erasure Experiment

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Step-Wise Approach to Quantum erasure:

1. Michelson Interferometer.
2. Mach-Zehnder Interferometer.
3. Quantum erasure.

Starting with Michelson Interferometer

Working and theory

Measurement of Laser's wavelength

Measurement of refractive index of glass

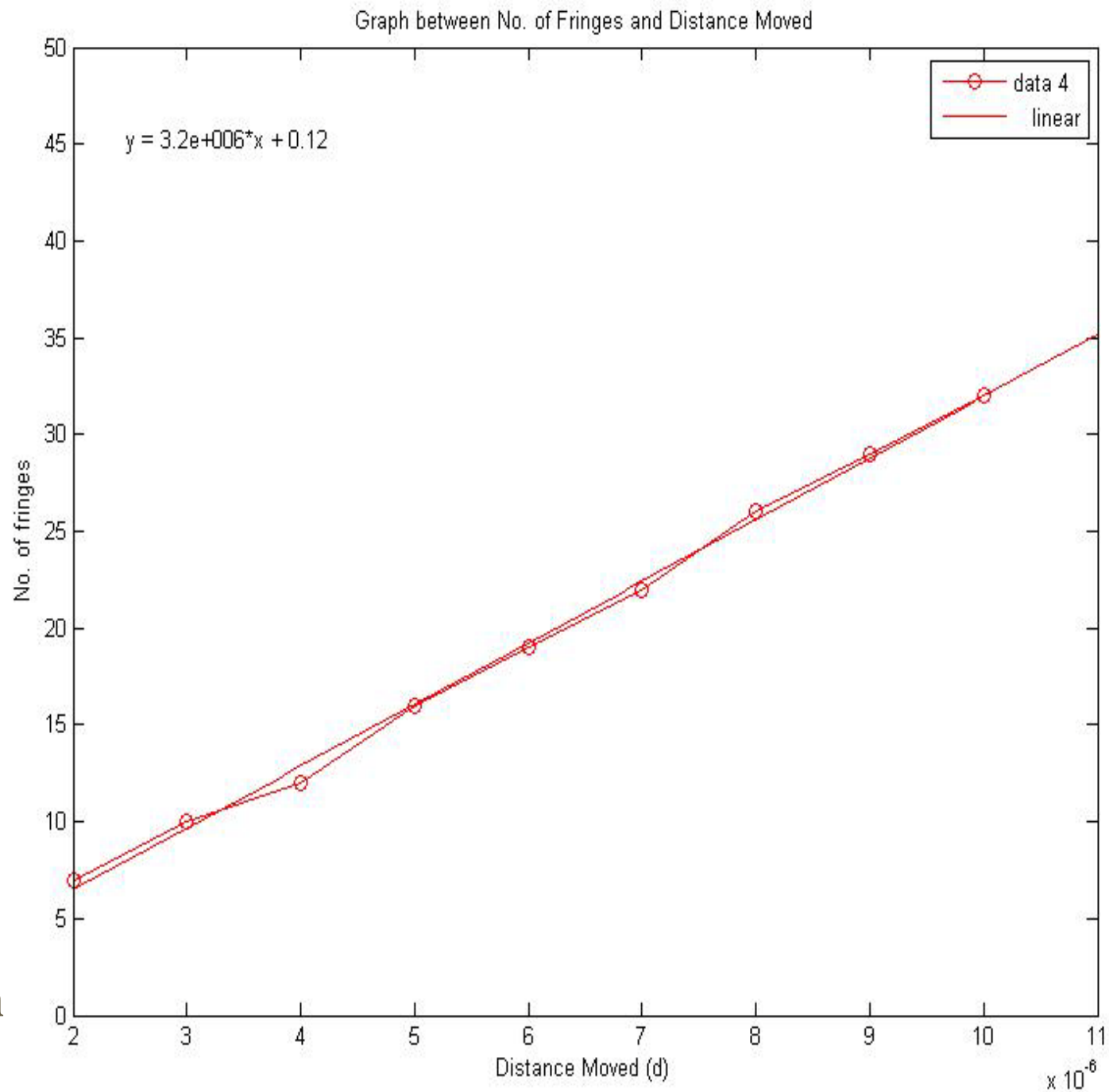
Measuring the Measured!

Measuring wavelength of laser light is quite a easy-to-do task.

Happy Wavelength Finding Recipe:

1. Start servo in sequence mode.
2. Count the number of fringes against the move.
3. Put the measurements in the formula.

Happy wavelength found 😊



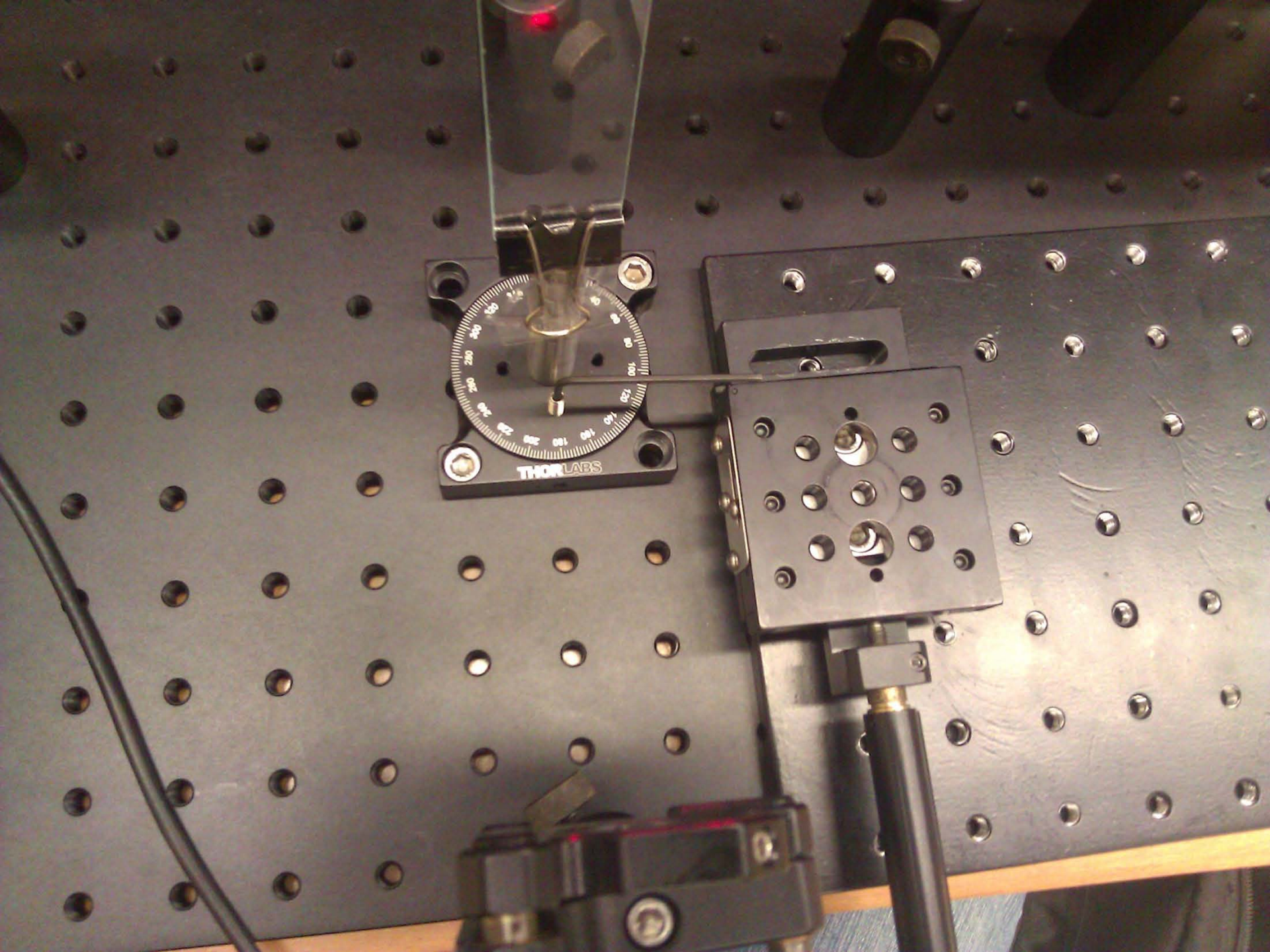
result
28.5 nm

Guessing, Counting, Re-counting Fringes

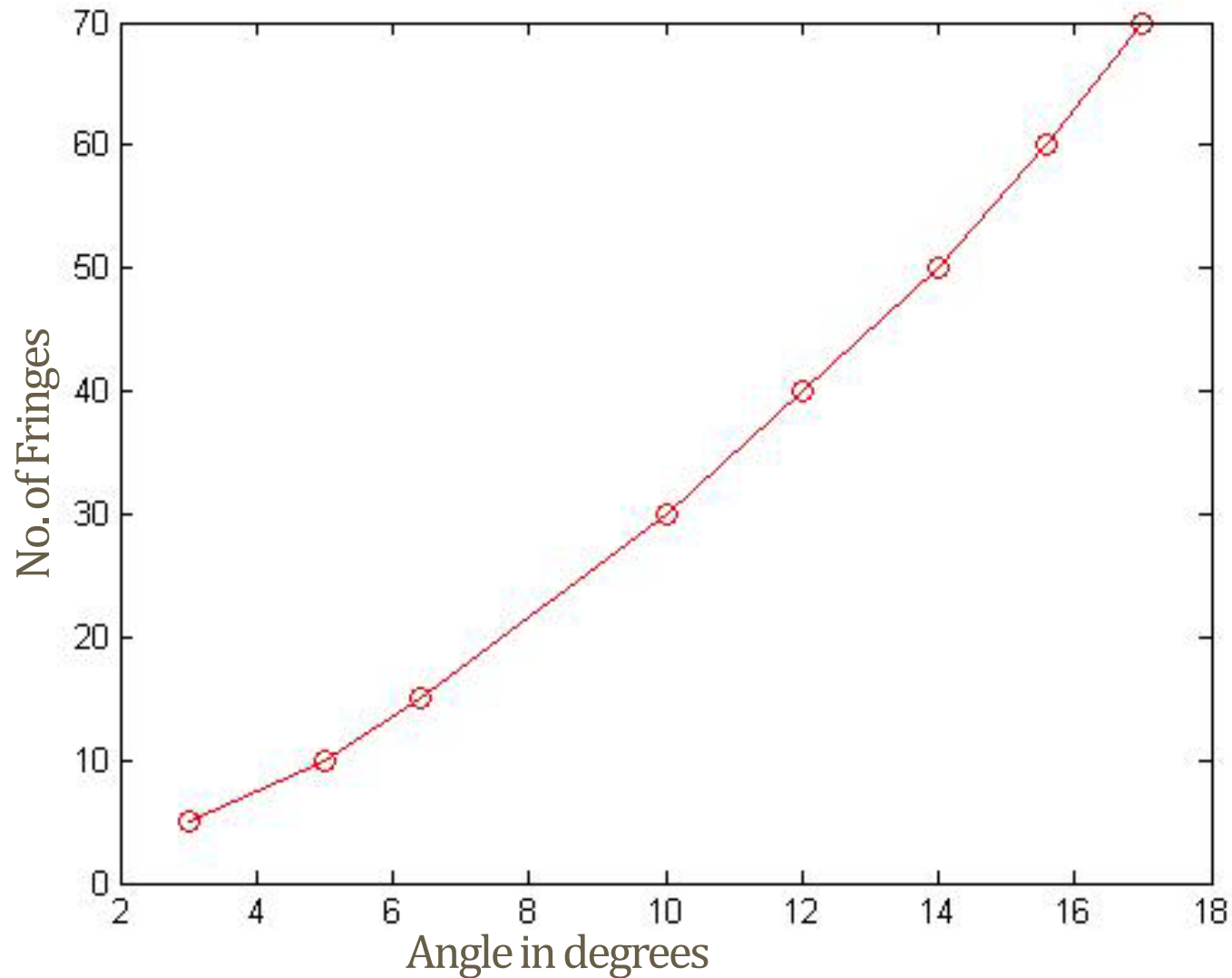
- The measurement of refractive index of glass with the help of Michelson Interferometer is a delicate and painstaking task**



- ** (if you seriously want to measure theta from -30 to +30 degrees)



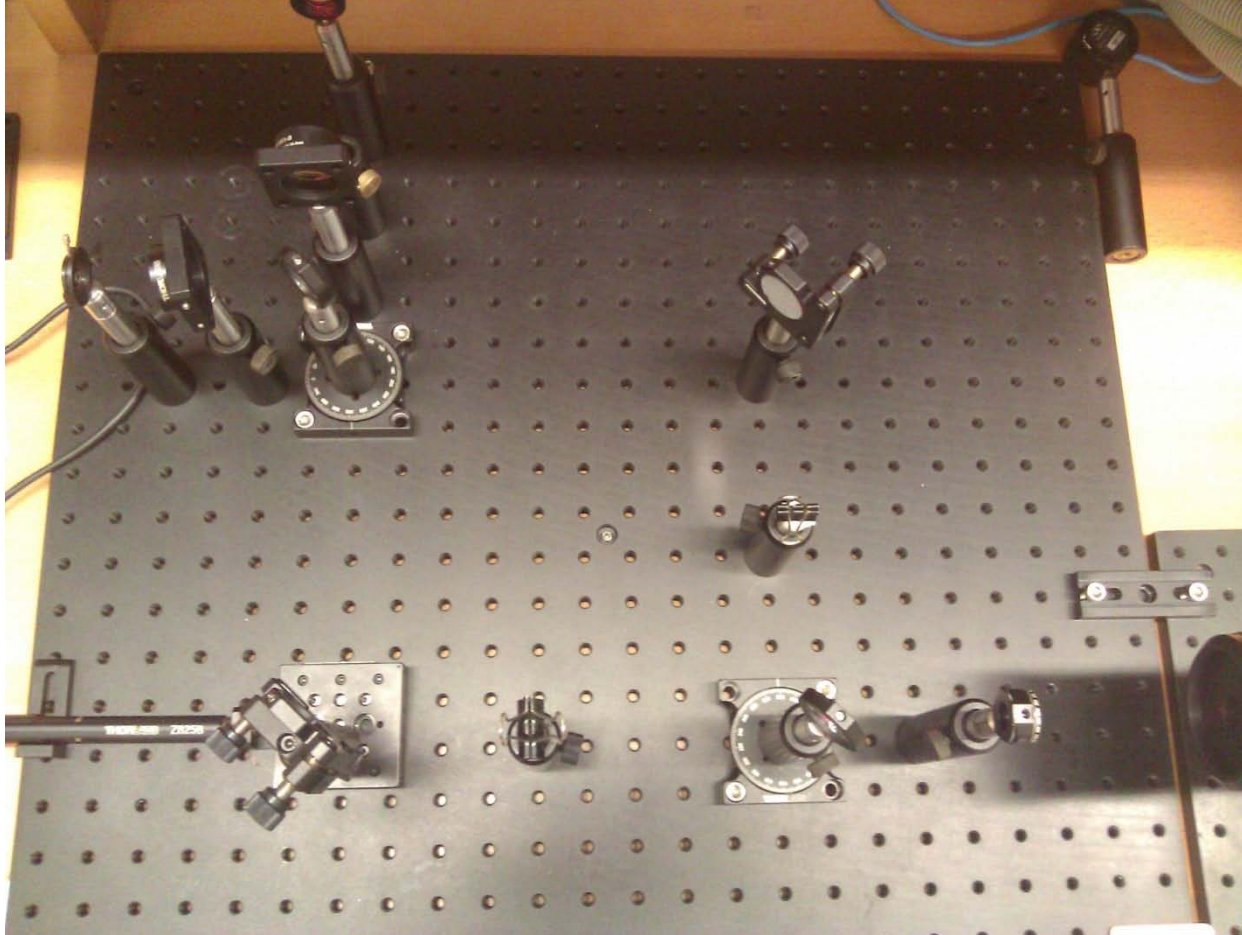
The curve desire...



Mach-Zehnder Interferometer (MZI)

- Working and theory.
- Setup
- Refractive index measurements
- Reasoning between the refractive index measurements
- Intensity pattern recording and description of utility of the tools used for this purpose

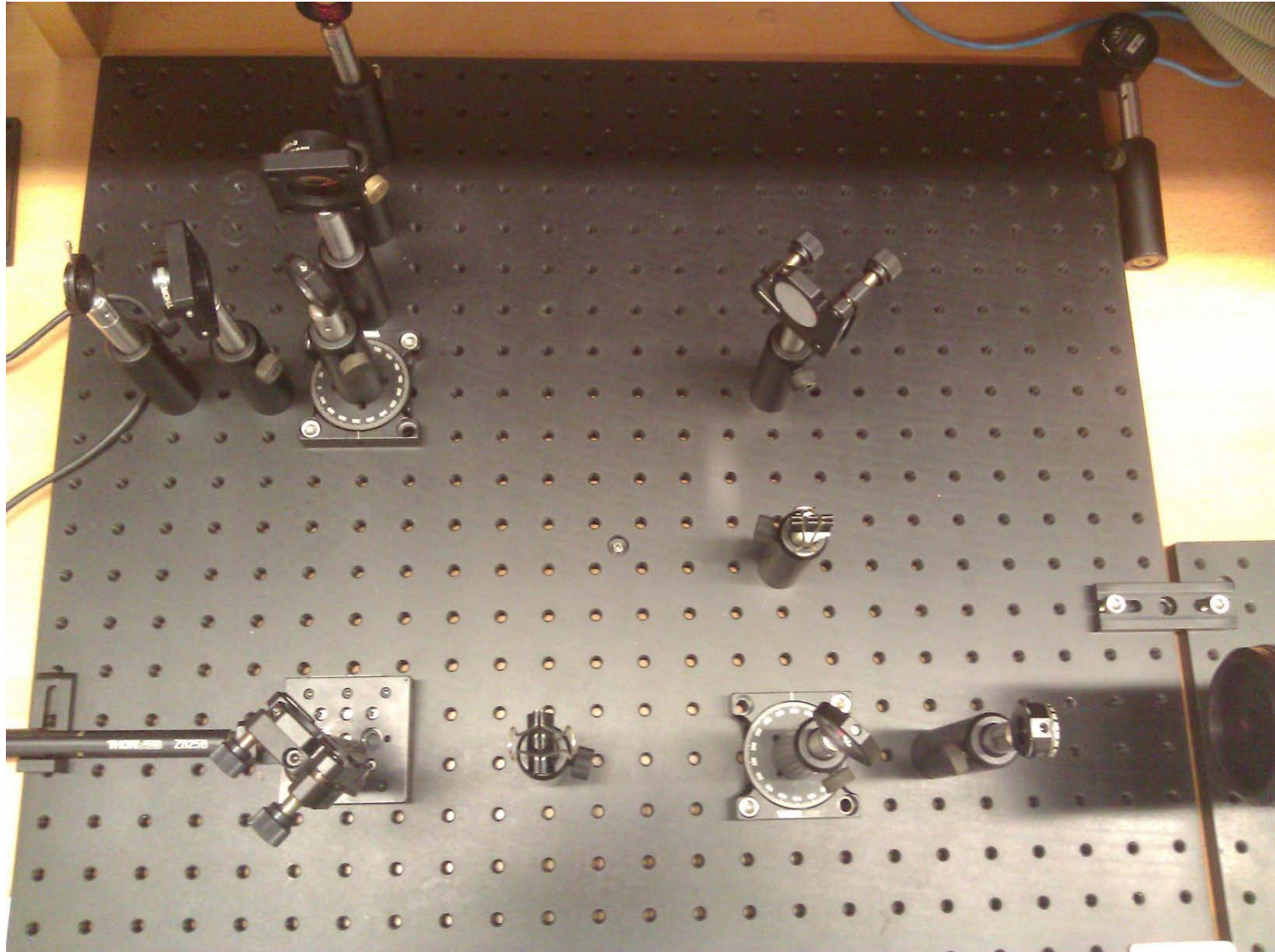
Behind the scenes; Unveiling the MZI paradox monster



The Quantum mechanically working of MZI actually, I mean to say...

Building up MZI (not to be confused with UZI)

Setup



Some more photographs

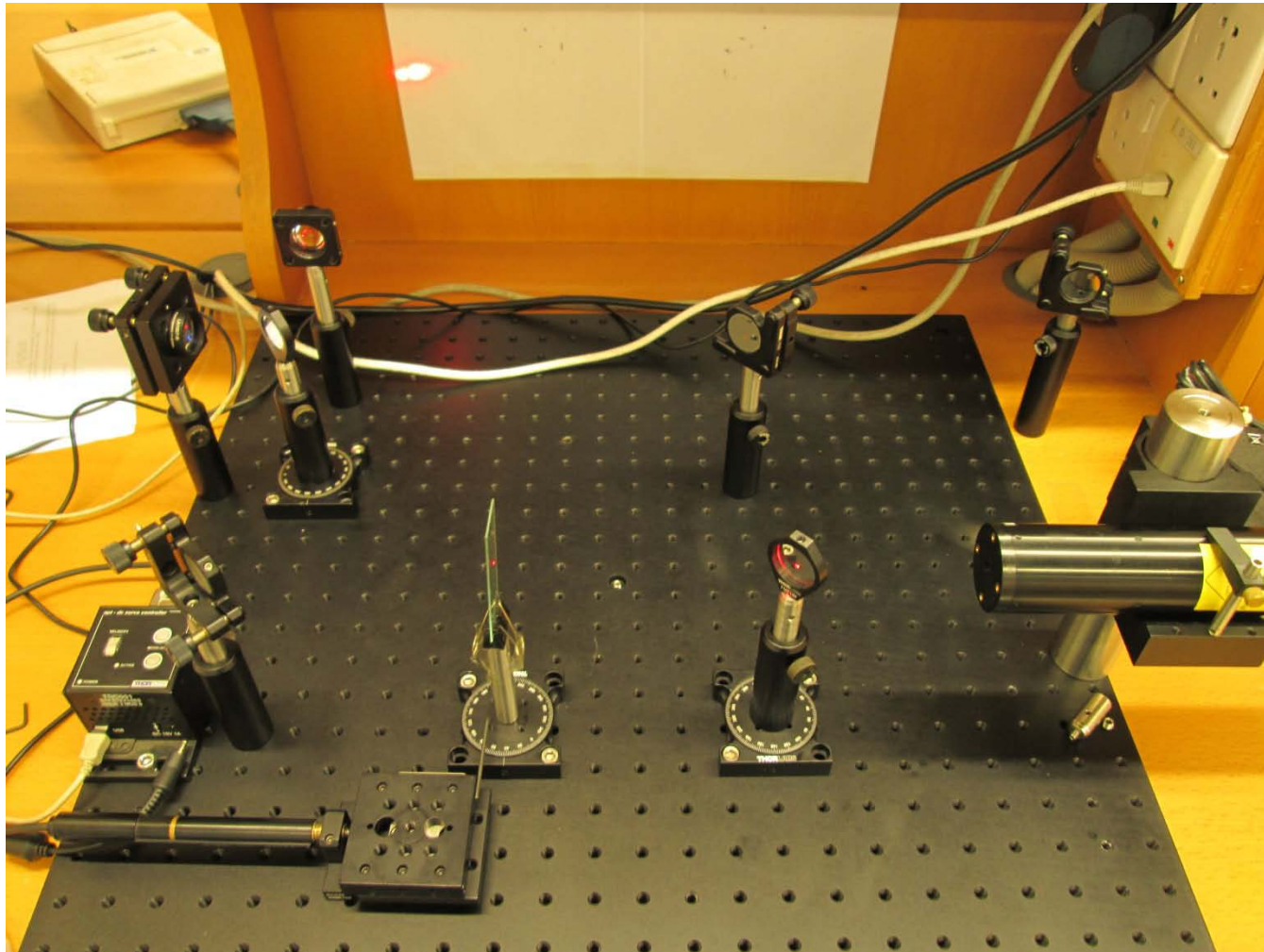




The Fringe Pattern!



Reviving memories of Refractive Index with MZI



B3

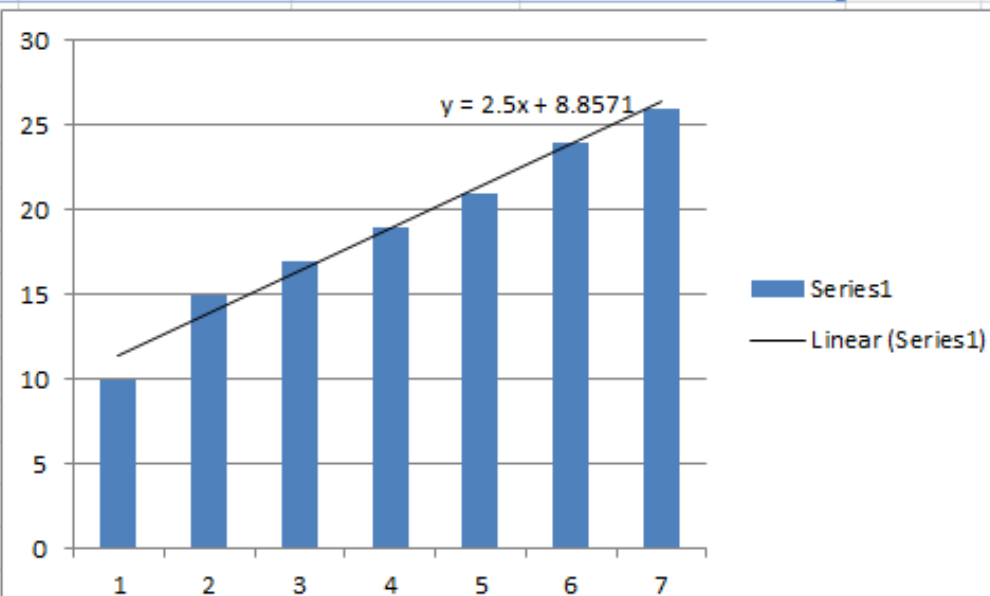
fx

Measuring Refractive index of glass using Mach-Zehnder Interferometer

	A	B	C	D	E	F	K	L
6	Sr.	Initial Angle	Final Angle	Difference(th	Theta in Radians	No of Fringes	Refractive Index	
7	1	327	317	10	0.174603175	10	1.681306555	
8	2	327	312	15	0.261904762	20	1.556279644	
9	3	327	310	17	0.296825397	25	1.530085196	
10	4	327	308	19	0.331746032	31	1.520716086	
11	5	327	306	21	0.366666667	40	1.563797362	
12	6	327	303	24	0.419047619	49	1.503260339	
13	7	327	301	26	0.453968254	60	1.533282067	
14	8	327	339	12	0.20952381	11	1.445407969	
15	9	327	341	14	0.244444444	15	1.444454046	
16	10	327	345	18	0.314285714	25	1.444459511	

Parameters

t	0.00102	meters
2t	0.00204	meters
wavelength	0.000000633	meters



Sheet1

Sheet2

Sheet3



Ready

Mean=1.52

St.dev=0.02

Keeping Record of Tracks; Some photographs







Quantum Erasure

Use of polarizers and their purpose.

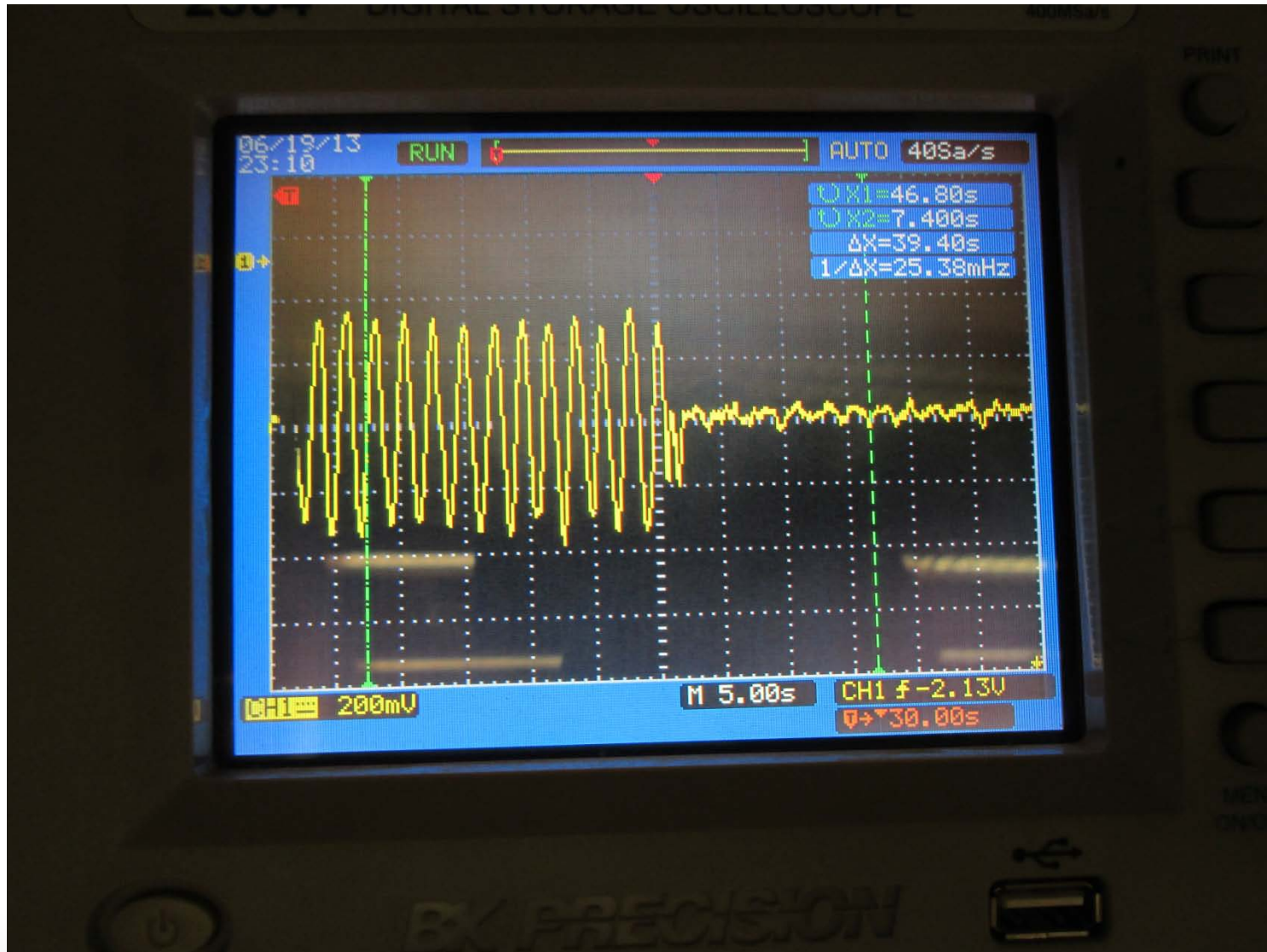
- How photons are marked and unmarked?
- How it is a delayed choice experiment?
- What are the outcomes of when this is done?
- Procedure of performing this experiment.
- Intensity variation pattern when P4 is rotated
- Interpretation and explanation of results in Quantum language.

The Good, The Bad and the Ugly Photons

- What are Marked and Unmarked Photons?

Forgetting to Remember; The Delayed Choice Experiment

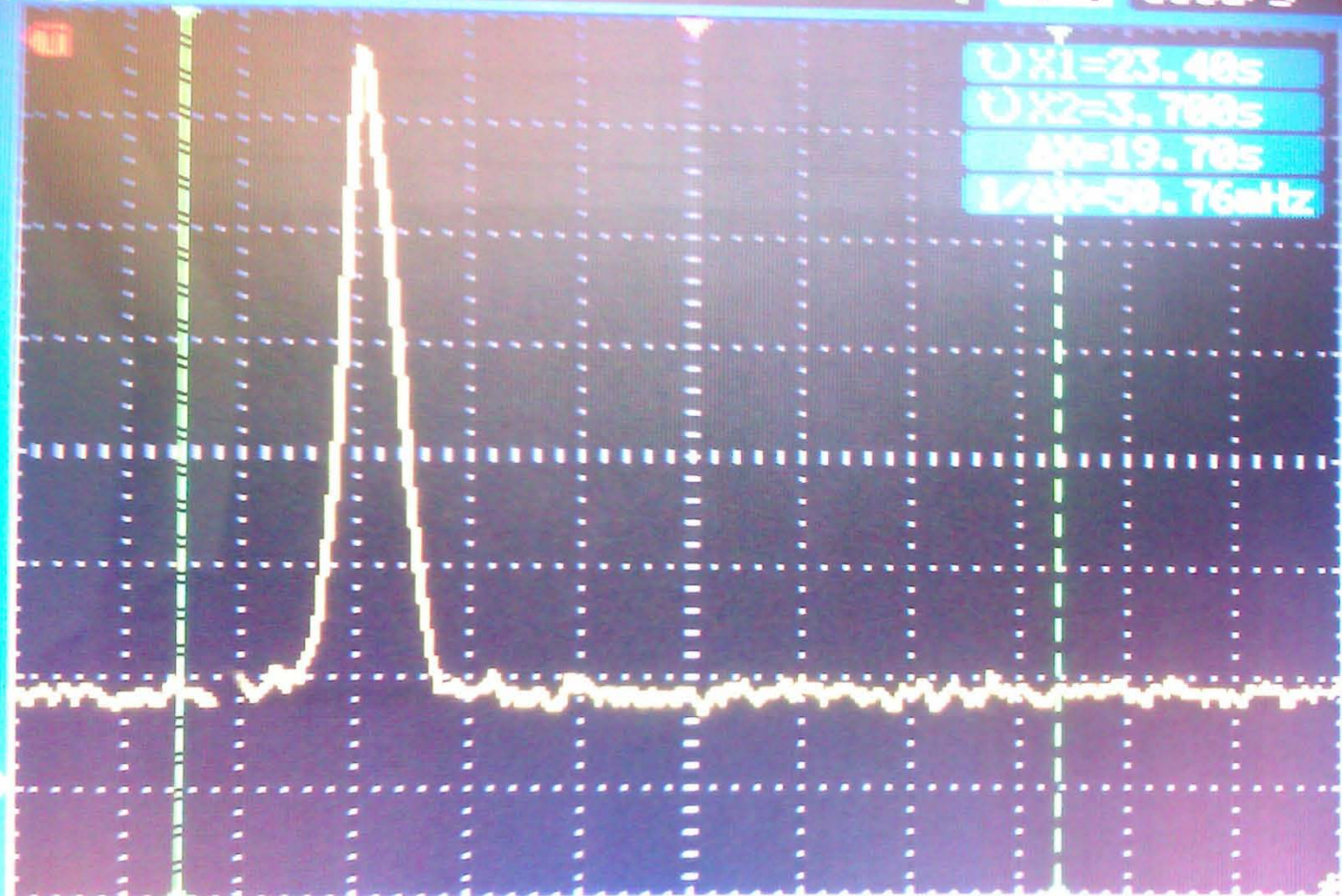
Checking if it Really works



1997-01-13

RUN

80Sa/s



U_{X1}=23.40s
U_{X2}=3.700s
Δt=19.70s
1/Δt=50.76kHz

200mV

M 2.50s

CH1 f-1.01V

φ→15.00s

Thank you