

	A	B	C	D	E	F	G	H	I	J
1	Phys 1102/1220 - Richmond Campus			DISCLAIMER: These example data are purposefully inaccurate. You may test your spreadsheet equations for correctness using these values, but your real experimental values will be very different.						
2	Experiment 4: Michelson Interferometer									
3	Your name, Partner's Name									
4	Date									
5										
6	Part A: Wavelength of a HeNe laser									
7	<u>DATA</u>									
8		Fringe counts			Initial micrometer reading			Final micrometer reading		
9	Trial	N	δN	$\delta N/N$	d_i (μm)	δd_i (μm)	$\delta d_i/d_i$	d_f (μm)	δd_f (μm)	$\delta d_f/d_f$
10	1	50	1	2.0%	206.3	0.5	0.2%	221.7	0.5	0.2%
11	2	48	1	2.1%	221.7	0.5	0.2%	236.9	0.5	0.2%
12	3	49	1	2.0%	236.9	0.5	0.2%	252.5	0.5	0.2%
13	4	50	1	2.0%	252.5	0.5	0.2%	267.9	0.5	0.2%
14	5	48	1	2.1%	267.9	0.5	0.2%	282.9	0.5	0.2%
15	6	49	1	2.0%	282.9	0.5	0.2%	298.6	0.5	0.2%
16										
17	<u>CALCULATIONS</u>									
18		Mirror distance			HeNe wavelength, in air			Average HeNe wavelength, in air		
19	Trial	d_m (μm)	δd_m (μm)	$\delta d_m/d_m$	λ (nm)	$\delta \lambda$ (nm)	$\delta \lambda/\lambda$	λ_{avg} (nm)	$\delta \lambda_{\text{avg}}$ (nm)	$\delta \lambda/\lambda$
20	1	15.4	0.70710678	4.6%	616	28.2842712	4.6%	627.980726	8.68711934	1.4%
21	2	15.2	0.70710678	4.7%	633.333333	29.4627825	4.7%			
22	3	15.6	0.70710678	4.5%	636.734694	28.8615013	4.5%			
23	4	15.4	0.70710678	4.6%	616	28.2842712	4.6%			
24	5	15	0.70710678	4.7%	625	29.4627825	4.7%			
25	6	15.7	0.70710678	4.5%	640.816327	28.8615013	4.5%			
26										
27	<u>UNCERT SUB-CALCS</u>									
28	$\partial \lambda / \partial d_m$	$\partial \lambda / \partial N$								
29	0.04	-1.232E-08								
30	0.04166667	-1.3194E-08								
31	0.04081633	-1.2995E-08								
32	0.04	-1.232E-08								
33	0.04166667	-1.3021E-08								
34	0.04081633	-1.3078E-08								

	A	B	C	D	E	F	G	H	I	J	K
1	Phys 1102/1220 - Richmond Campus			DISCLAIMER: These example data are purposefully							
2	Experiment 4: Michelson Interferometer			inaccurate. You may test your spreadsheet equations							
3	Your name, Partner's Name			for correctness using these values, but your real							
4	Date			experimental values will be very different.							
5											
6	Part B: Index of refraction of air										
7	DATA										
8	Atmospheric pressure			Chamber Length			HeNe wavelength, in vacuum				
9	Patm (cm Hg)	δP_{atm} (cm Hg)	$\delta P/P_{atm}$	L (mm)	δL (mm)	$\delta L/L$	λ_0 (nm)	$\delta \lambda_0$ (nm)	$\delta \lambda_0/\lambda_0$		
10	76	0.5	0.7%	25	0.1	0.4%	632.991	0	0.0%		
11											
12		Fringe Counts		Initial Pressure		Final Pressure					
13	Trial	N	δN	$\delta N/N$	Pi (cm Hg)	δP_i (cm Hg)	$\delta P_i/P_i$	Pf (cm Hg)	δP_f (cm Hg)	$\delta P_f/P_f$	
14	1	25	1	4.0%	0	2	#DIV/0!	78	2	2.6%	
15	2	25	1	4.0%	0	2	#DIV/0!	80	2	2.5%	
16	3	26	1	3.8%	0	2	#DIV/0!	78	2	2.6%	
17	4	25	1	4.0%	0	2	#DIV/0!	81	2	2.5%	
18	5	24	1	4.2%	0	2	#DIV/0!	79	2	2.5%	
19	6	25	1	4.0%	0	2	#DIV/0!	80	2	2.5%	
20											
21	CALCULATIONS										
22	Chamber Length			HeNe wavelength, in vacuum							
23	L (m)	δL (m)	$\delta L/L$	HeNe λ_0 (m)	$\delta \lambda_0$ (m)	$\delta \lambda_0/\lambda_0$					
24	0.025	0.0001	0.4%	6.32991E-07	0	0.0%					
25											
26	Absolute Pressure Difference			Index of refraction of air			Average index of refraction				
27	Trial	$ \Delta P $ (cm Hg)	$\delta \Delta P $ (cm Hg)	$\delta \Delta P / \Delta P $	n_{atm}	δn_{atm}	$\delta n/n_{atm}$	n_{avg}	δn_{avg}	$\delta n/n_{avg}$	
28	1	78	2.828427125	3.6%	1.00030838	1.68179E-05	0.0017%	1.000303282	8.19914E-06	0.0008%	
29	2	80	2.828427125	3.5%	1.000300671	1.62175E-05	0.0016%				
30	3	78	2.828427125	3.6%	1.000320715	1.7132E-05	0.0017%				
31	4	81	2.828427125	3.5%	1.000296959	1.59326E-05	0.0016%				
32	5	79	2.828427125	3.6%	1.000292298	1.62146E-05	0.0016%				
33	6	80	2.828427125	3.5%	1.000300671	1.62175E-05	0.0016%				
34											
35	UNCERT SUB-CALCS										
36	$\partial n/\partial P_{atm}$	$\partial n/\partial L$	$\partial n/\partial N$	$\partial n/\partial \Delta P$							
37	4.05763E-06	-0.012335209	1.23352E-05	-3.95359E-06							
38	3.95619E-06	-0.012026829	1.20268E-05	-3.75838E-06							
39	4.21994E-06	-0.012828618	1.23352E-05	-4.11174E-06							
40	3.90735E-06	-0.01187835	1.18783E-05	-3.66616E-06							
41	3.84602E-06	-0.011691905	1.21791E-05	-3.69997E-06							
42	3.95619E-06	-0.012026829	1.20268E-05	-3.75838E-06							