

UM-SJTU PHYSICS LABORATORY
DATA SHEET (EXERCISE 4)

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Date: 2021.11.19

NOTICE. Please remember to show the data sheet to your instructor before leaving the laboratory. The data sheet will not be accepted if the data are recorded with pencil or modified by correction fluid/tape. If a mistake is made in recording a datum item, cancel the wrong value by drawing a fine line through it, record the correct value legibly, and ask your instructor to confirm the correction. Please remember to take a record of the precision of the instruments used. You are required to hand in the original data with your lab report, so please keep the data sheet properly.

Uncertainty of θ is $[2]^\circ$.


Maximum Electric Current I_0 <u>2.00</u> <u>2.55</u> $\pm 0.01 \text{ } \mu\text{A}$			
θ	$I \text{ } \mu\text{A} \pm 0.01 \text{ } \mu\text{A}$	θ	$I \text{ } \mu\text{A} \pm 0.01 \text{ } \mu\text{A}$
0°	2.00	50°	1.01
5°	1.97	55°	0.82
10°	1.97	60°	0.69
15°	1.92	65°	0.48
20°	1.84	70°	0.34
25°	1.73	75°	0.23
30°	1.60	80°	0.11
35°	1.49 1.46	85°	0.04
40°	1.33	90°	0.01
45°	1.18		

Table 1. Measurement data Malus' law demonstration.

Instructor's signature: 

Rotation angle of the 1/2-wave plate	Rotation angle of the analyzer [°] \pm [2]°
initial	0
10°	18
20°	18 36
30°	20 56
40°	18 74
50°	18 92
60°	20 112
70°	20 132
80°	20 152
90°	20 172

Table 2. Measurement data for the 1/2-wave plate.

Instructor's signature: 

Rotation angle of 1/4-wave plate: 0°			
Maximum Electric Current I_0		$1.50 \pm 0.01 \mu A$	
θ	$I [\mu A] \pm 0.01 [\mu A]$	θ	$I [\mu A] \pm 0.01 [\mu A]$
0°	0.02	180°	0.02
10°	0.07	190°	0.08
20°	0.22	200°	0.20
30°	0.43	210°	0.44
40°	0.69	220°	0.69
50°	0.93	230°	0.94
60°	1.15	240°	1.10
70°	1.33	250°	1.31
80°	1.38	260°	1.43
90°	1.42	270°	1.50
100°	1.35	280°	1.39
110°	1.19	290°	1.25
120°	0.99	300°	1.06
130°	0.82	310°	0.85
140°	0.57	320°	0.60
150°	0.34	330°	0.35
160°	0.17	340°	0.15
170°	0.05	350°	0.02

Table 3. Measurement data for the 1/4-wave plate (rotation angle 0°).

Instructor's signature: lyman

Rotation angle of the 1/4-wave plate: 20°			
Maximum Electric Current I_0		$1.19 \pm 0.01 \text{ [uA]}$	
θ	$I \text{ [uA]} \pm 0.01 \text{ [uA]}$	θ	$I \text{ [uA]} \pm 0.01 \text{ [uA]}$
0°	0.19	180°	0.18
10°	0.22	190°	0.22
20°	0.32	200°	0.31
30°	0.44	210°	0.45
40°	0.60	220°	0.61
50°	0.77	230°	0.76
60°	0.89	240°	0.93
70°	1.03	250°	1.02
80°	1.09	260°	1.16
90°	1.11	270°	1.19
100°	1.07	280°	1.17
110°	1.03	290°	1.08
120°	0.92	300°	0.97
130°	0.78	310°	0.80
140°	0.61	320°	0.60
150°	0.45	330°	0.43
160°	0.31	340°	0.31
170°	0.21	350°	0.23

Table 4. Measurement data for the 1/4-wave plate (rotation angle 20°).

Instructor's signature: Yman

Rotation angle of the 1/4-wave plate: 45°			
Maximum Electric Current I_0		$0.680 \pm 0.001 \text{ [uA]}$	
θ	$I \text{ [uA]} \pm 0.001 \text{ [uA]}$	θ	$I \text{ [uA]} \pm 0.001 \text{ [uA]}$
0°	0.566	180°	0.553
10°	0.572	190°	0.606
20°	0.568	200°	0.600
30°	0.573	210°	0.609
40°	0.596	220°	0.617
50°	0.624	230°	0.646
60°	0.614	240°	0.648
70°	0.627	250°	0.650 0.648
80°	0.664	260°	0.666 0.650
90°	0.664	270°	0.666
100°	0.646	280°	0.680
110°	0.624	290°	0.672
120°	0.633	300°	0.673
130°	0.635	310°	0.645
140°	0.654	320°	0.620
150°	0.646	330°	0.605
160°	0.627	340°	0.587
170°	0.602	350°	0.576

Table 5. Measurement data for the 1/4-wave plate (rotation angle 45°).

Rotation angle of the 1/4-wave plate: 70°	
$\theta \text{ [°]} \pm 0.2^\circ$	90
$I \text{ [uA]} \pm 0.001 \text{ [uA]}$	1.111

Table 6. Measurement data for the 1/4-wave plate (rotation angle 70°).

Instructor's signature: Yuan