UM-SJTU Physics Laboratory
Data Sheet (Exercise 4)

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Group: 8 Date: 2019.10.25

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]°.

Maximum Electric Current I_0		0.993 ± 0.001 [μA]	
θ	I [μA] ± 0.001 [μA]	θ	I [μA] ± 0.001 [μA]
0°	~~1.000~~ 0.983	50°	0.389
5°	~~0.987~~ 0.961	55°	0.318
10°	~~0.961~~ 0.931	60°	0.235
15°	~~0.936~~ 0.898	65°	0.168
20°	~~0.875~~ 0.852	70°	0.107
25°	~~0.814~~ 0.802	75°	0.062
30°	0.735	80°	0.025
35°	0.639	85°	0.005
40°	0.568	90°	0.000
45°	0.480		

Table 1. Measurement data Malus' law demonstration.

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Rotation angle of the 1/2–wave plate	Rotation angle of the analyzer [°] ±[2]°
initial	0
10°	20
20°	41
30°	61
40°	81
50°	101
60°	122
70°	141
80°	159
90°	180

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

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Rotation angle of 1/4–wave plate: 0°			
Maximum Electric Current I_0 0.638 ~~0.650~~ $\pm$ 0.001 [μA]			
θ	I [μA] $\pm$ 0.001 [μA]	θ	I [μA] $\pm$ 0.001 [μA]
0°	0.621	180°	0.638
10°	0.612	190°	0.612
20°	0.575	200°	0.556
30°	0.492	210°	0.469
40°	0.388	220°	0.372
50°	0.270	230°	0.269
60°	0.158	240°	0.150
70°	0.072	250°	0.067
80°	0.022	260°	0.017
90°	0.001	270°	0.001
100°	0.020	280°	0.022
110°	0.074	290°	0.082
120°	0.156	300°	0.167
130°	0.258	310°	0.276
140°	0.376	320°	0.380
150°	0.470	330°	0.484
160°	0.548	340°	0.576
170°	0.606	350°	0.605

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

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Rotation angle of the 1/4–wave plate: 20°			
Maximum Electric Current I_0 0.57~~0.543~~ ± 0.001 [μA]			
θ	I [μA] ±0.001 [μA]	θ	I [μA] ± 0.001 [μA]
0°	0.542	180°	0.577
10°	0.528	190°	0.566
20°	0.493	200°	0.531
30°	0.436	210°	0.468
40°	0.357	220°	0.366
50°	0.273	230°	0.296
60°	0.200	240°	0.206
70°	0.141	250°	0.145
80°	0.094	260°	0.101
90°	0.080	270°	0.086
100°	0.094	280°	0.095
110°	0.137	290°	0.135
120°	0.203	300°	0.184
130°	0.304	310°	0.252
140°	0.377	320°	0.334
150°	0.445	330°	0.404
160°	0.532	340°	0.461
170°	0.562	350°	0.504

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

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Rotation angle of the 1/4–wave plate: 45°			
Maximum Electric Current I_0	0.368 ± 0.001 [μA]		
θ	I [μA] ± 0.001 [μA]	θ	I [μA] ± 0.001 [μA]
0°	0.324	180°	0.322
10°	0.317	190°	0.319
20°	0.314	200°	0.320
30°	0.317	210°	0.318
40°	0.322	220°	0.321
50°	0.327	230°	0.326
60°	0.335	240°	0.335
70°	0.353	250°	0.345
80°	0.343	260°	0.352
90°	0.348	270°	0.360
100°	0.348	280°	0.366
110°	0.350	290°	0.366
120°	0.346	300°	0.368
130°	0.364	310°	0.363
140°	0.358	320°	0.356
150°	0.350	330°	0.349
160°	0.342	340°	0.337
170°	0.328	350°	0.330

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

Rotation angle of the 1/4–wave plate: 70°	
θ [°] ± [2]°	140
I [μA] ± 0.001 [μA]	0.609

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

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