

Experiment

Marking Scheme

E2

English



Q2 Exploring the spatial structure of the sample with optical methods
(10 points)

Part	Score	Partial Score	Remarks	Totals	
A	A1	0.5	0.25	For X: within ± 300 ; $\pm(400\sim 600)$, 0.1 pt	1.0
			0.25	For Y: within ± 500 ; $\pm(600\sim 1000)$, 0.1 pt	
	A2	0.5	0.1	Interference pattern shown	
			0.15	First order: (x,y) and S within (± 0.08 , ± 0.08)	
			0.15	Second order: (x,y) and S within (± 0.08 , ± 0.08)	
0.1	ΔS within ± 0.04				
B	B1	0.5	0.5	Correct formula for d	3.0
	B2	1.5	0.25x3	(x,y) and S , each column, 0.05 pt	
			0.25x3	$\tan^{-1}\left(\frac{S}{L}\right)$: within $\pm 10\%$; $\pm 11\%\sim 20\%$, 0.1pt	
	B3	1.0	0.1x3	Correct calculation for d , 0.1 pt each	
			0.2x3	Correct calculation for a , 0.2 pt each	
			0.1	\bar{a} ; within 0.35%	
C	C1	0.8	0.1x4	$\tan^{-1}\left(\frac{S}{L}\right)$ within 2% for 4-7 order on Axis1 within 2%~5%, 0.05 pt	2.5
			0.1x4	$\tan^{-1}\left(\frac{S}{L}\right)$ within 2% for 4-7 order on Axis2 within 2%~5%, 0.05 pt	
	C2	0.7	0.15	ΔS_ℓ correct calculation by average; without average values 0.1 pt	
			0.15	ΔS_w correct calculation by average; without average values 0.1 pt	
			0.2	Correct calculation for ℓ	
			0.2	Correct calculation for w	
	C3	1.0	0.4	Correct drawing	
			0.6	Angle ϕ ; $\pm 1.50^\circ$; $\pm 1.51^\circ \sim \pm 3.00^\circ$, 0.3pt	

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				90°- ϕ within $\pm 1.50^\circ$, 0.2pt; 90°- ϕ within $\pm 1.51^\circ \sim \pm 3.00^\circ$, 0.1pt		
D	D1	1.9	1.2	correct coordinates and diagram score scaled from numbers of bright spots (from 2×2 to 4×4)	2.5	
			0.2	notation of ΔS_x and ΔS_y		
			0.5	0.1		calculation methods
				0.4		0.4 for ΔS_x and ΔS_y within ± 0.4 cm 0.2 for ΔS_x and ΔS_y within ± 1.0 cm
	D2	0.6	0.6	$d_x ; d_y$ within $\pm 2.5\%$		
			0.4	$d_x ; d_y$ within $\pm 5\%$		
0.2			$d_x ; d_y$ with $\pm 10\%$			
E	E1	1.0	0.2	Correct mark for ℓ	1.0	
			0.2	Correct mark for w		
			0.2	Correct mark for d_x		
			0.2	Correct mark for d_x		
			0.2	Correct mark for ϕ		