

# Advanced Photon Source

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## Report on Optical Substrate Measurements

<b>Date:</b> 02/21/2005	<b>Reference #:</b> M05044A	<b>Page #</b> 1/4
<b>Component:</b> Flat trapezoid Si mirror	<b>Requester:</b> Eric. Dufresne <b>Affiliation:</b> MHATT-CAT	<b>Date in/out:</b> Feb 21, 05/Feb. 21, 05
<b>Manufacturer:</b>	<b>Beamline:</b> 07-ID	
Lab coordinator: L. Assoufid	Measurement by: J. Qian	Report by: J. Qian

### Description of the measured component:

Flat trapezoid Si mirror:

- Surface size: 100 mm x 42 mm x 20 mm
- Coating: Pt

### Performed measurements:

- Surface roughness
- Surface slope

### Instruments used for measuring:

An "X" indicates the instrument(s) used.

- Surface roughness:  WYKO-TOPO-2D,  1.5x  5x  40x  
 WYKO-TOPO-3D,  1.5x  5x  40x
- Surface figure:  WYKO-6000
- Surface slope:  LTP

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## Surface roughness measurement with the TOPO 2D, objective 5X

- The separation of adjacent measured spots was about 10 mm.
- Table 1 summarizes the roughness measurement results of the mirror.
- Figure 1 shows an example of the surface roughness profiles.

Table 1. Results of the roughness measurements. (Profile length: 2.66 mm)

Meas. (#)	RMS (nm)	P-V (nm)	Radius (m)	Figure (#)
1	0.151	1.50	1254	1
2	0.145	1.06	879	
3	0.109	0.78	1013	
4	0.208	1.85	906	
5	0.121	1.40	928	
<b>Mean</b>	<b>0.147</b>	<b>1.32</b>		

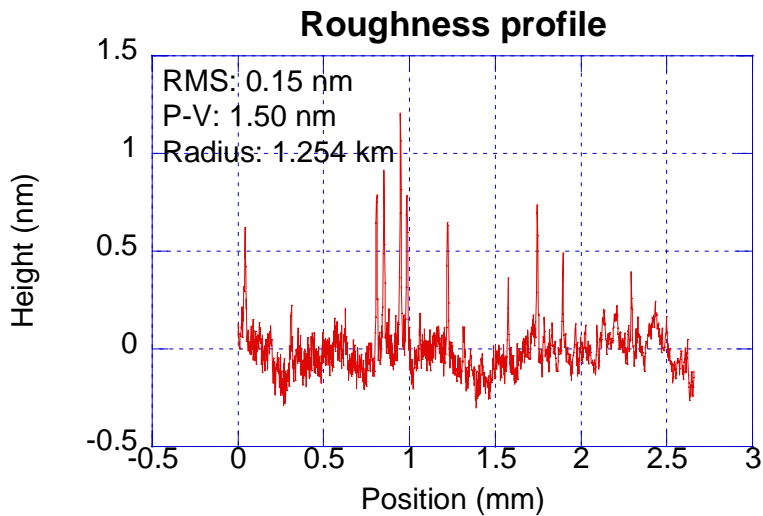


Figure 1. An example of the roughness profiles (measurement 1).

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## Surface slope profile measurement with the LTP

- The mirror was set face-up and scanned over a length of 96 mm along the central line (see Figure 2).
- Table 2 summarizes the results of the LTP measurements. Residual slope data were obtained by removing the best-fit cylinder from the LTP raw profiles.
- Figures 3 and 4 show the residual slope and height profiles with different lengths.

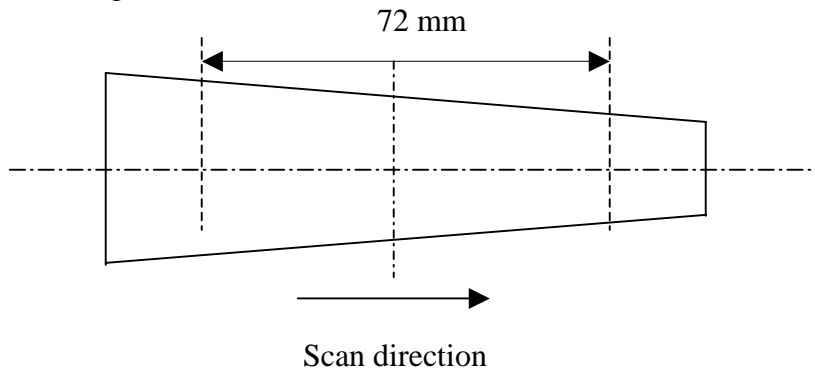


Figure 2. Scan direction.

Table 2. Results of the surface slope measurements.

Profile length (mm)	Residual slope		Residual height		Radius (km)	Figure (#)
	RMS ( $\mu\text{rad}$ )	P-V ( $\mu\text{rad}$ )	RMS ( $\mu\text{m}$ )	P-V ( $\mu\text{m}$ )		
96	2.66	14.15	0.05	0.08	2.42	3
72	1.25	5.69	0.02	0.03	1.98	4

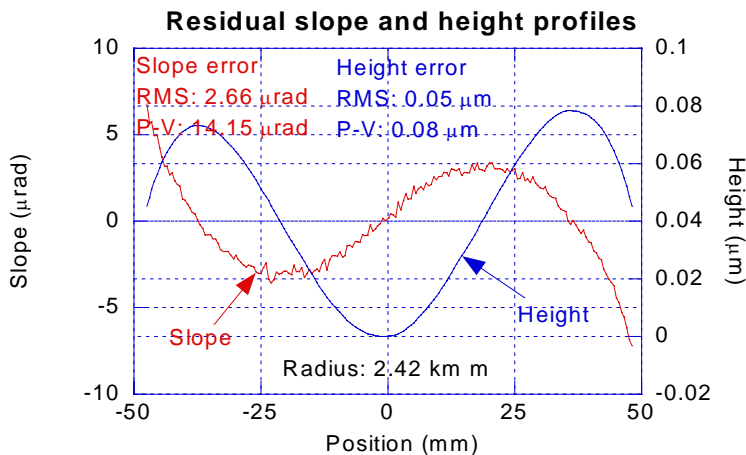


Figure 3. Residual slope and height profiles of the mirror. (Length: 96 mm)

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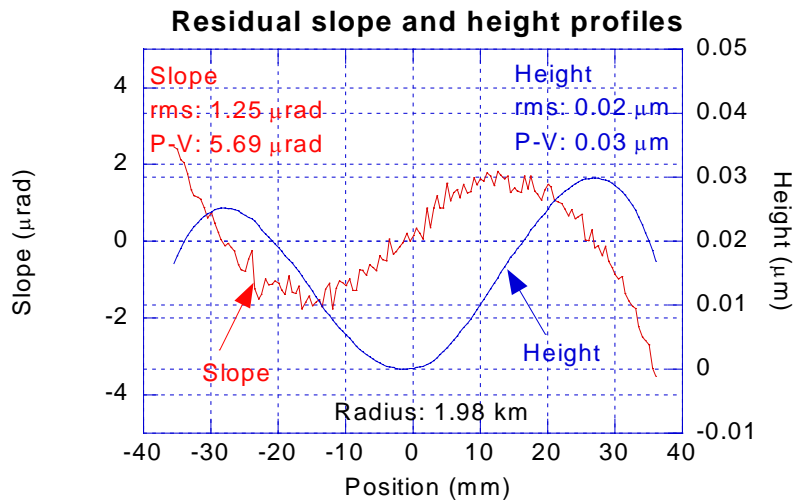


Figure 4. Residual slope and height profiles of the mirror. (Length: 72 mm)