

A decorative graphic on the left side of the slide, consisting of several thin, curved lines in shades of grey and green, and a solid red arrow pointing to the right.

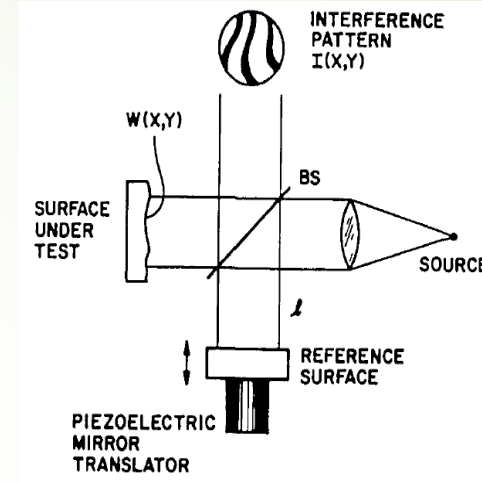
Design and Construction of a Laser Interferometer to Study Thin Metal Films

Sean Daigler
Brandon Hoffman

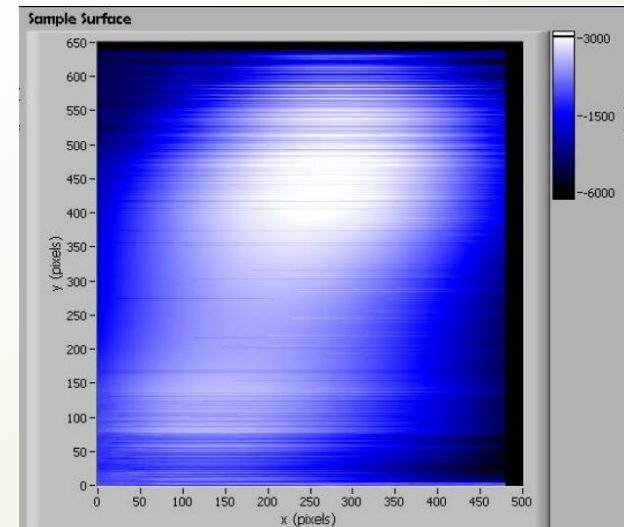
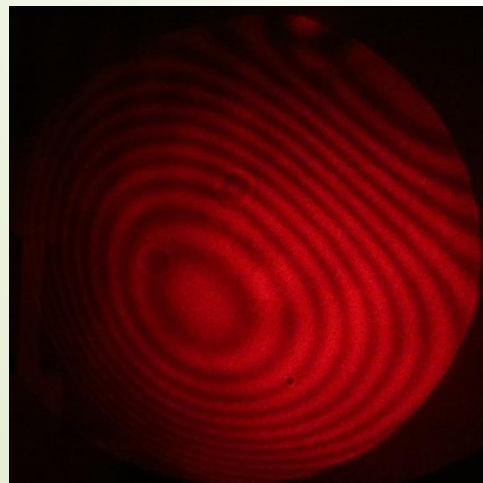
Outline



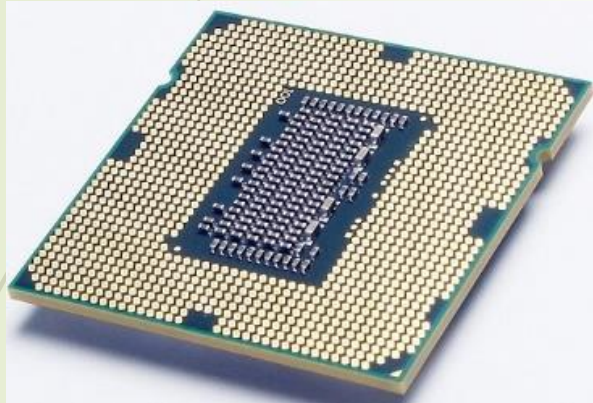
omicron-lab.com



Twyman-Green Interferometer



Thin Film Applications

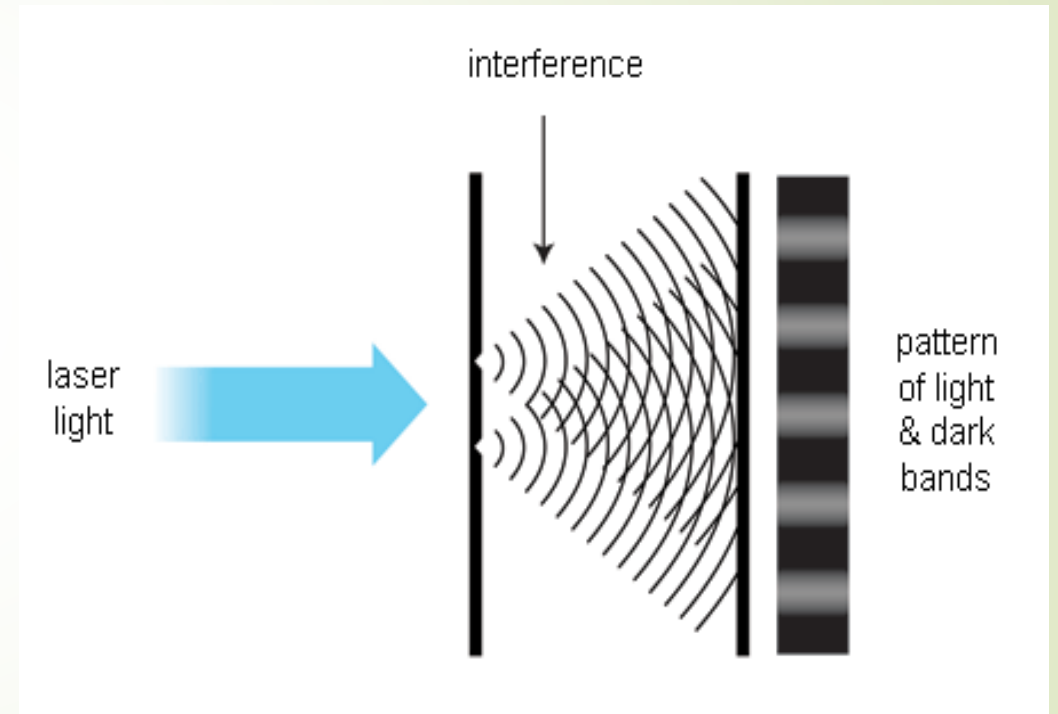
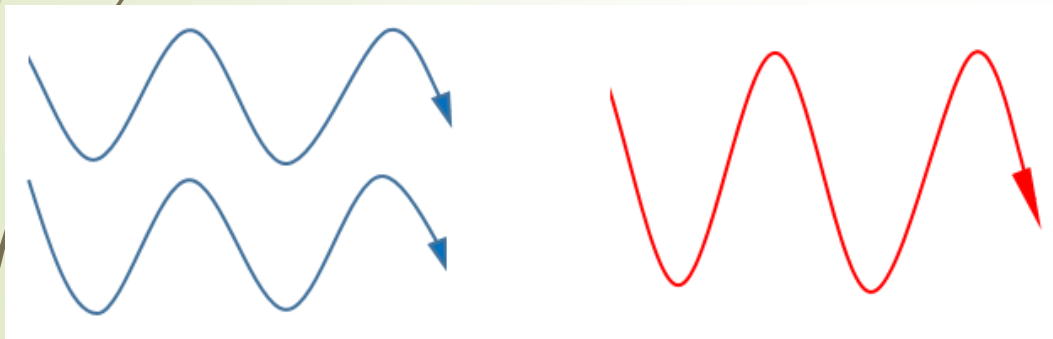
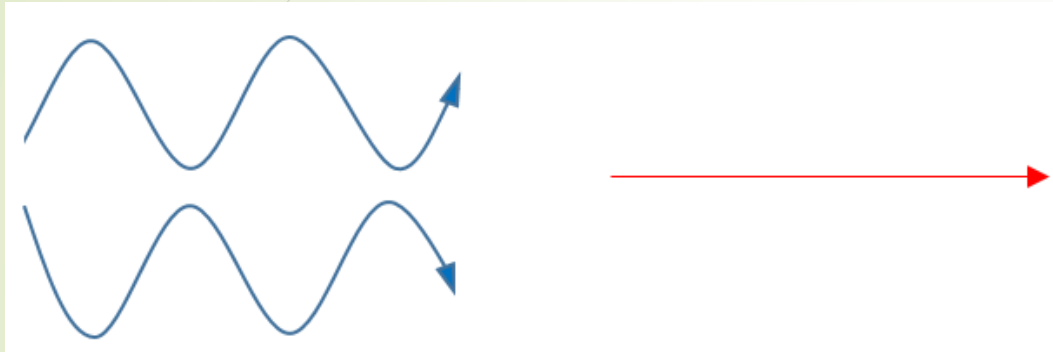


Computer-builder.com

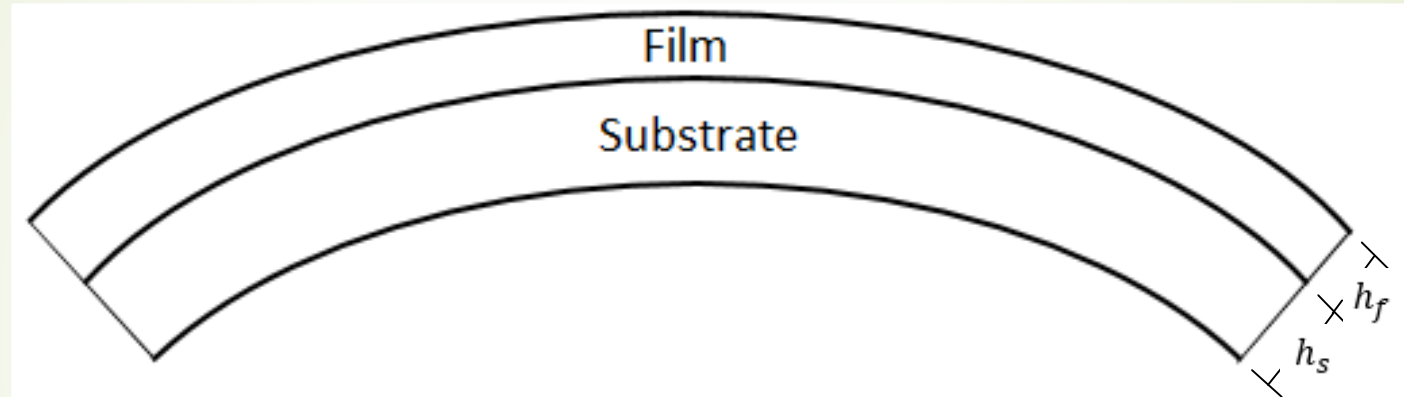


pngimg.com

Theory

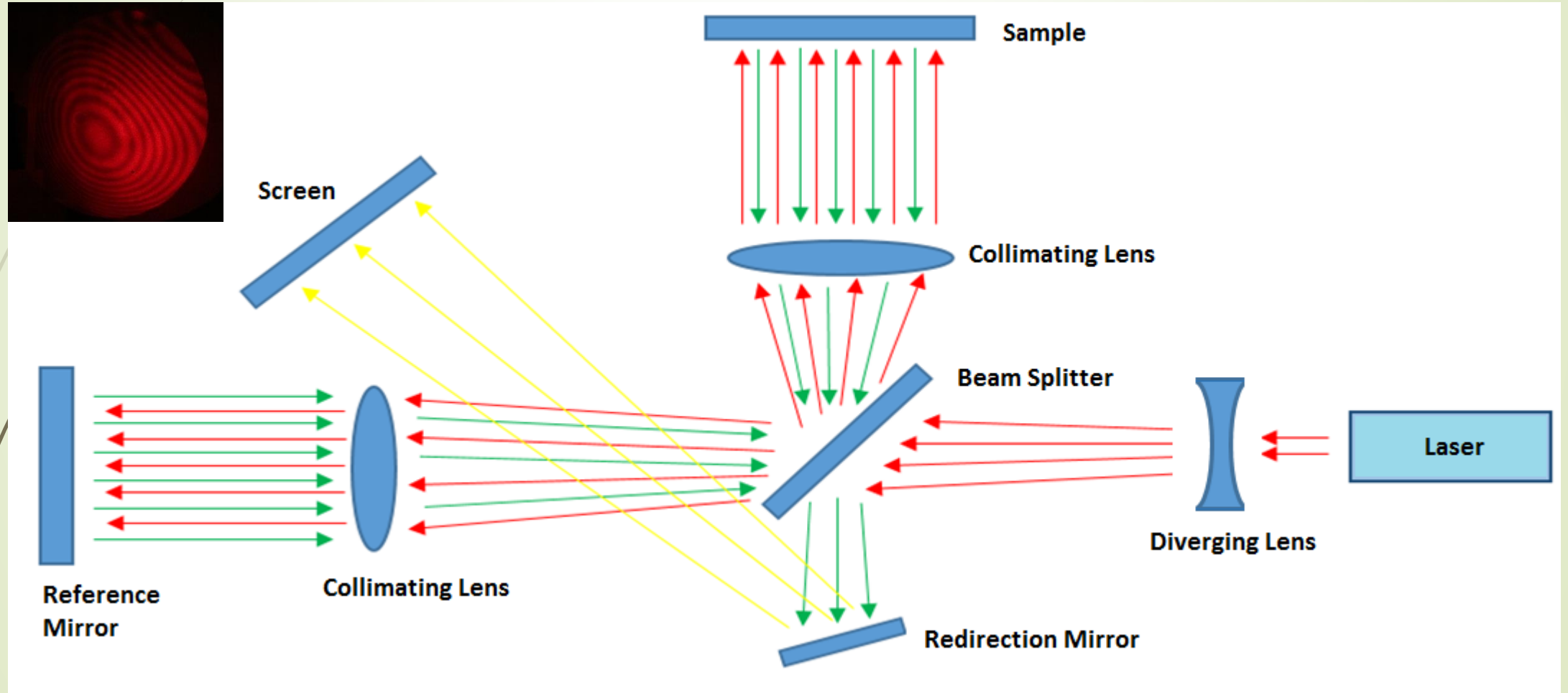


Stoney Formula

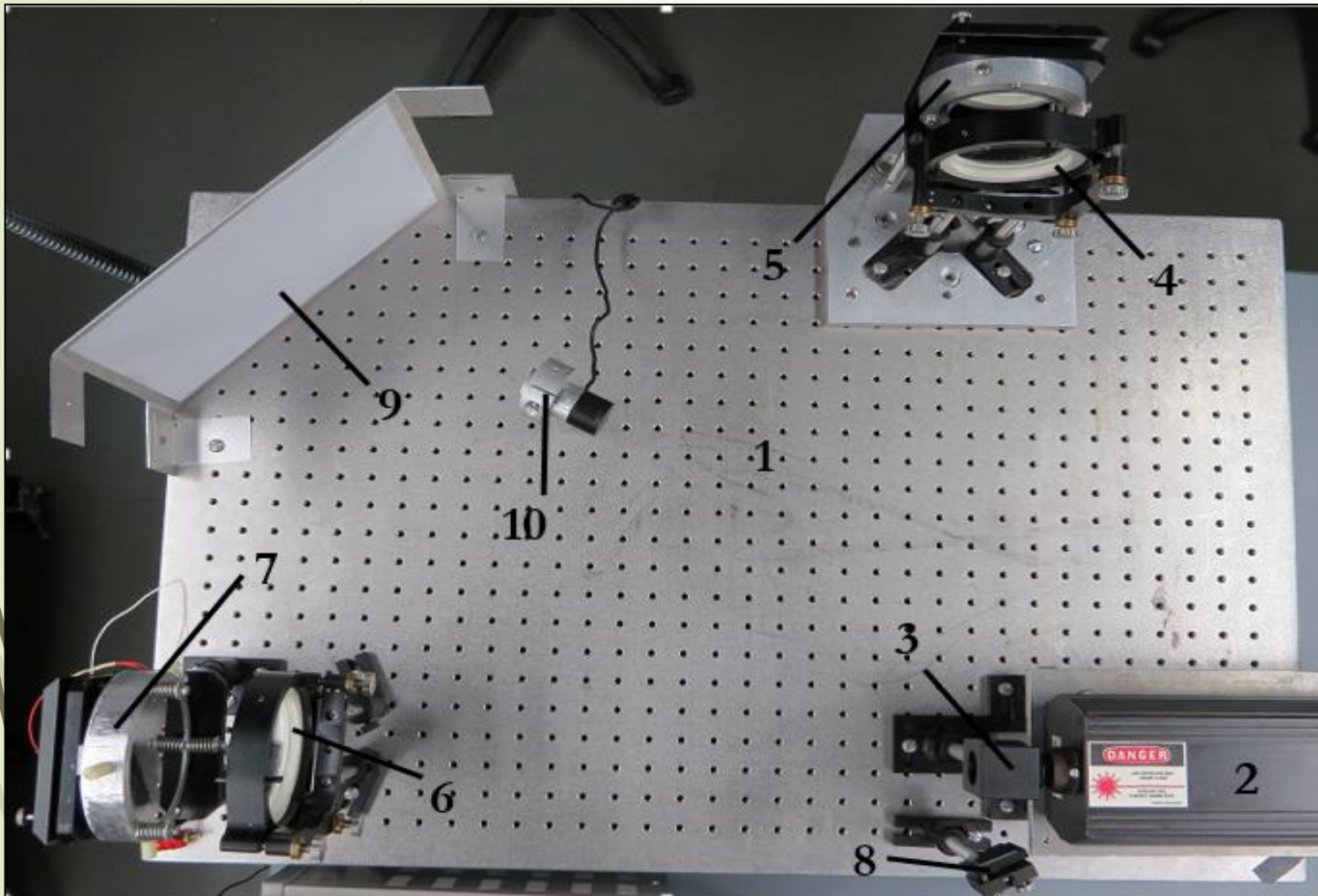


$$\sigma_{avg} = \frac{\kappa M_s h_s^2}{6h_f}$$

Interferometer

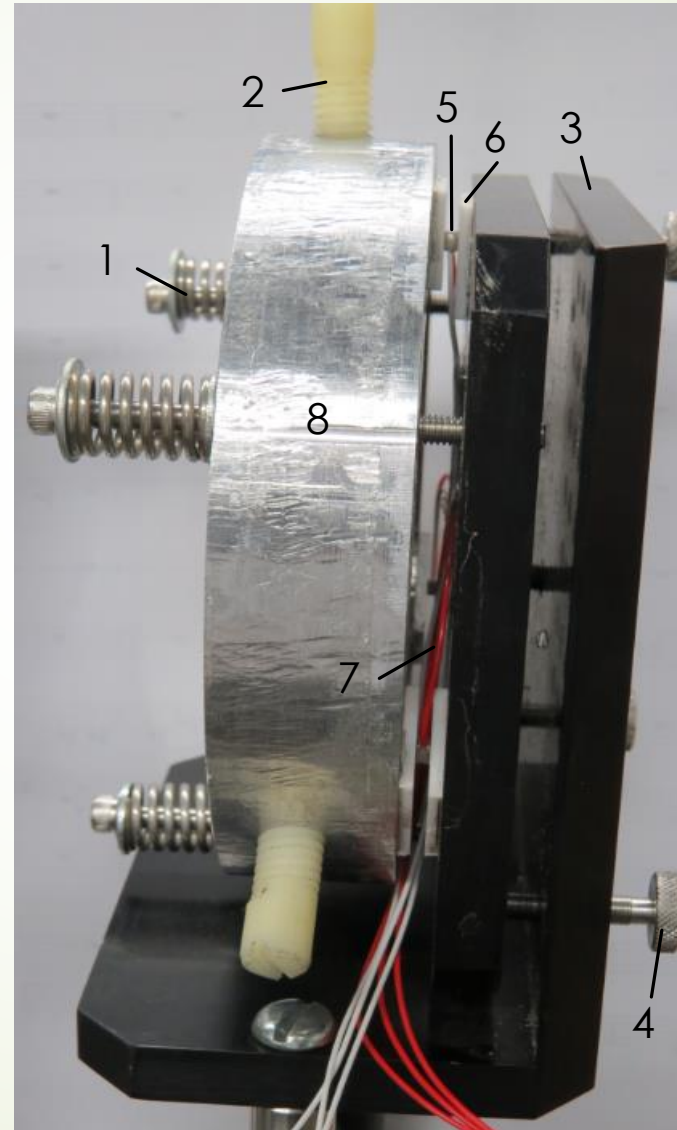
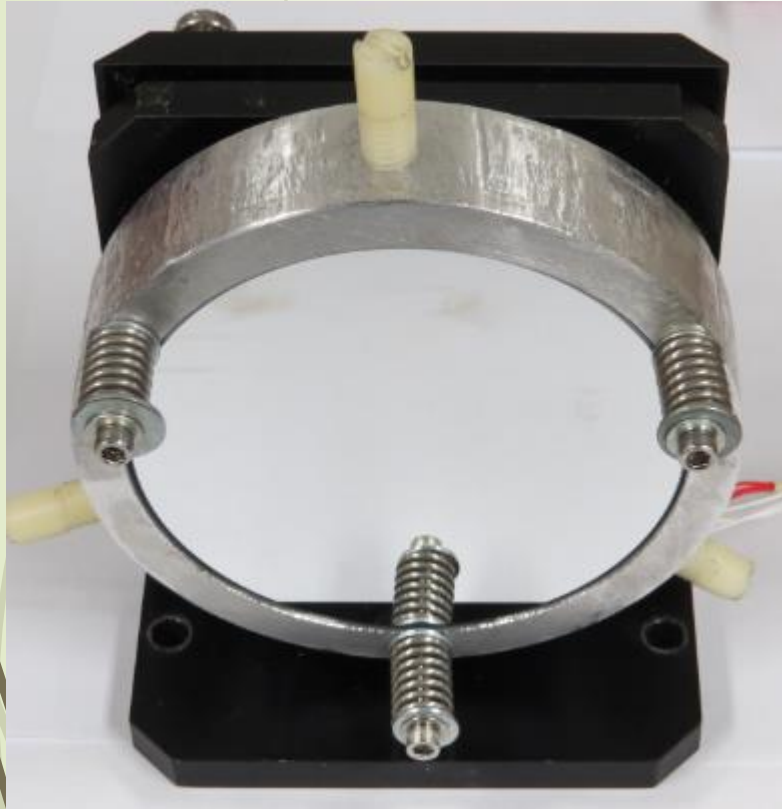


Houghton Interferometer



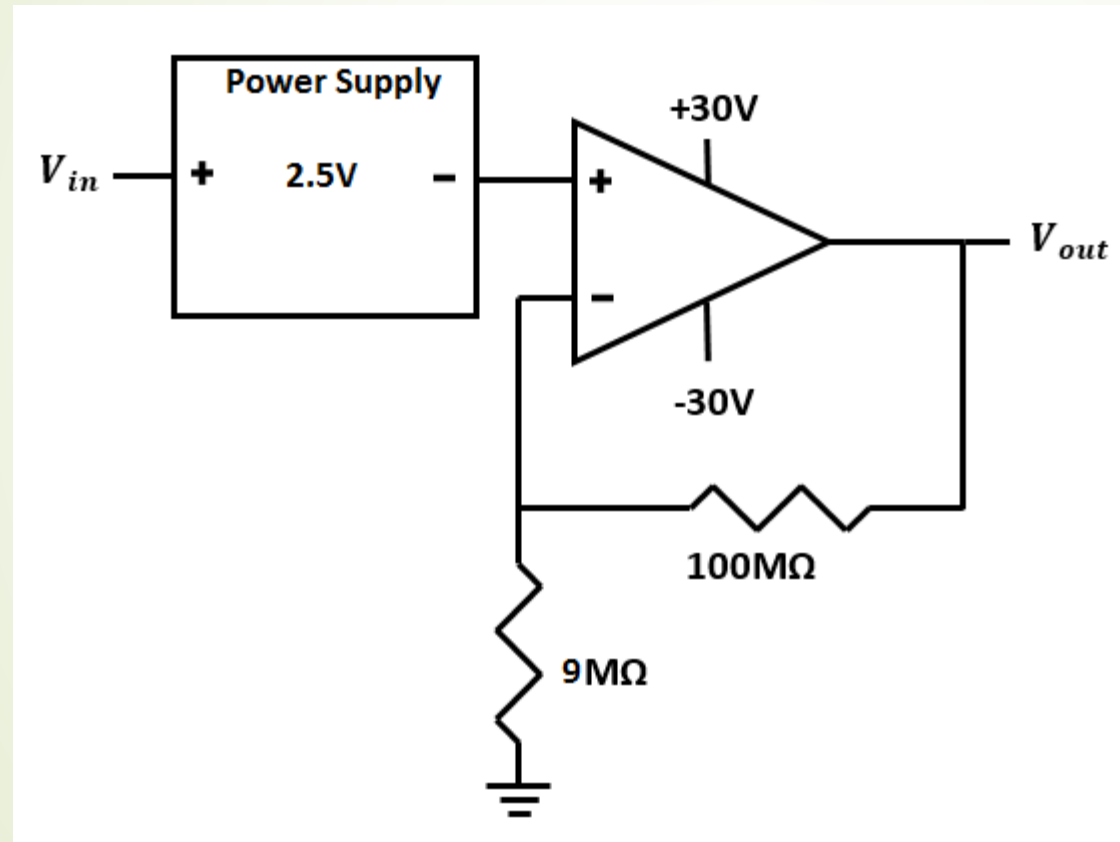
- 1: Optics Table
- 2: 632nm Laser
- 3: Beam Splitter
- 4: Sample Collimating Lens
- 5: Sample Mirror
- 6: Reference Collimating Lens
- 7: Reference Mirror
- 8: Image Redirection Mirror
- 9: Screen
- 10: Webcam

Reference Mirror



- 1: Compression Springs
- 2: Plastic Screws
- 3: Kinematic Mount
- 4: Mount Adjustment Screws
- 5: Piezoelectric Ceramic Actuator
- 6: Ceramic Buffers
- 7: Piezo Leads
- 8: Mirror Holder

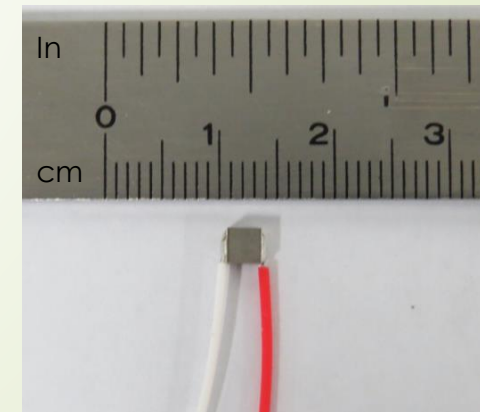
Driving the Reference Mirror



$$V_{out} = (V_{in} - 2.5V) \left(\frac{R_1 + R_2}{R_2} \right)$$

$$V_{out} = (V_{in} - 2.5V) \left(\frac{100M\Omega + 9M\Omega}{9M\Omega} \right)$$

$$V_{out} = 12.1 (V_{in} - 2.5V)$$



Interference Pattern

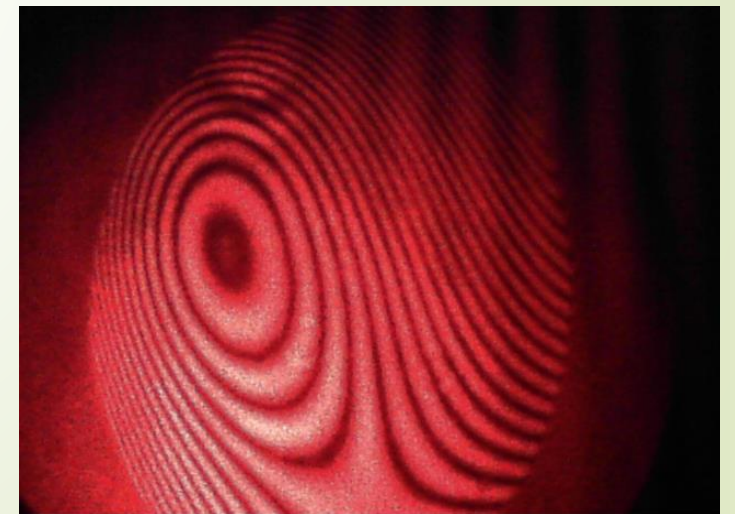
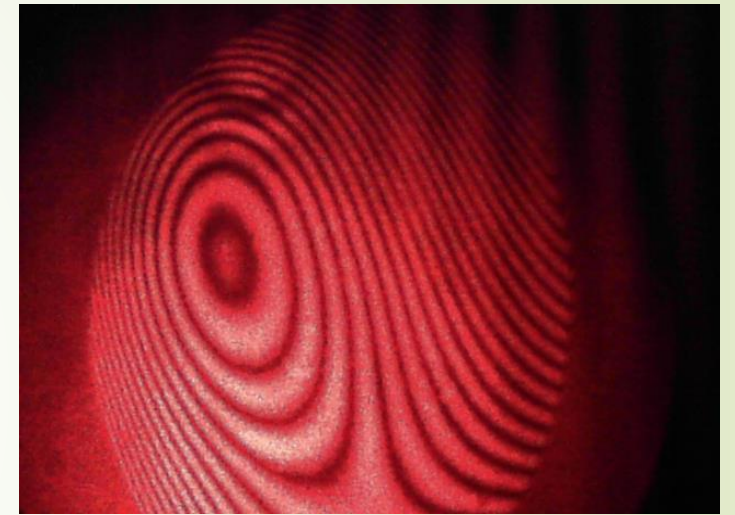
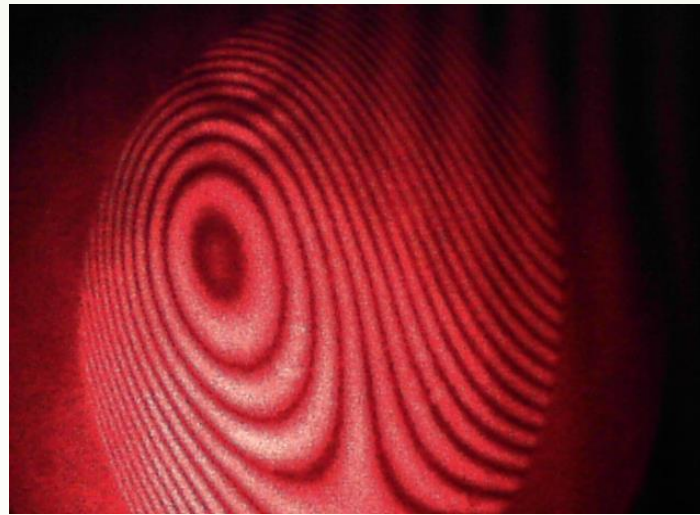
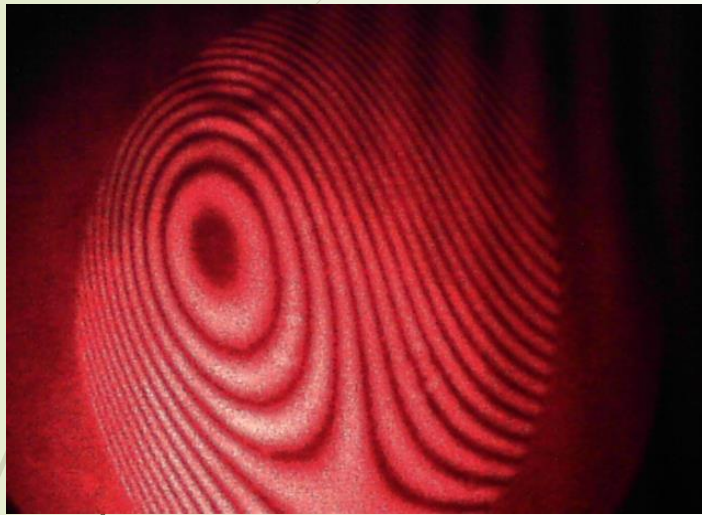
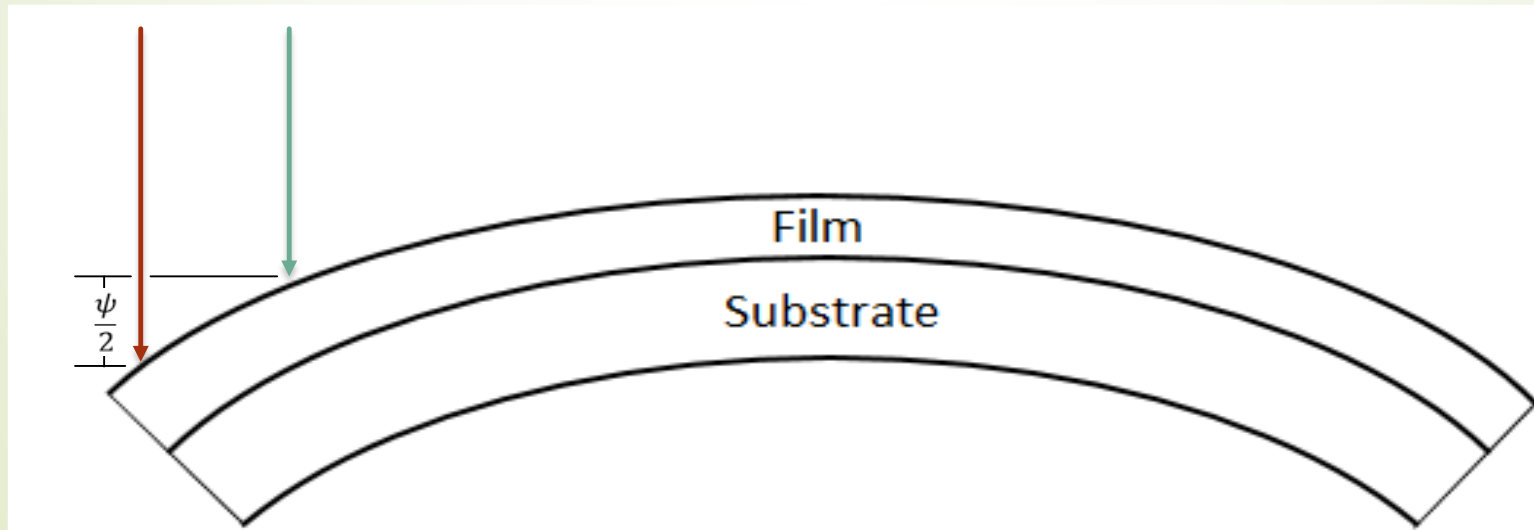
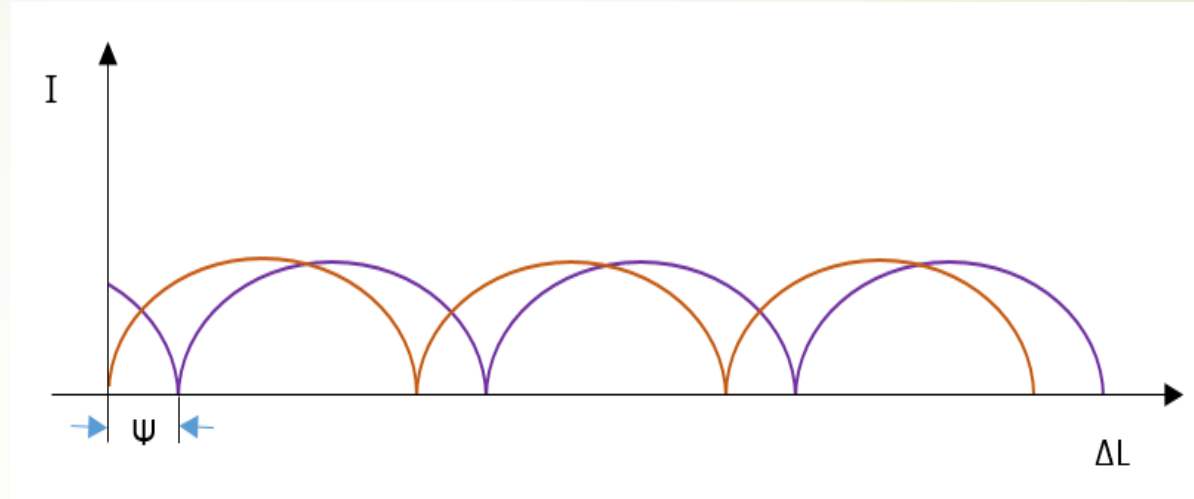
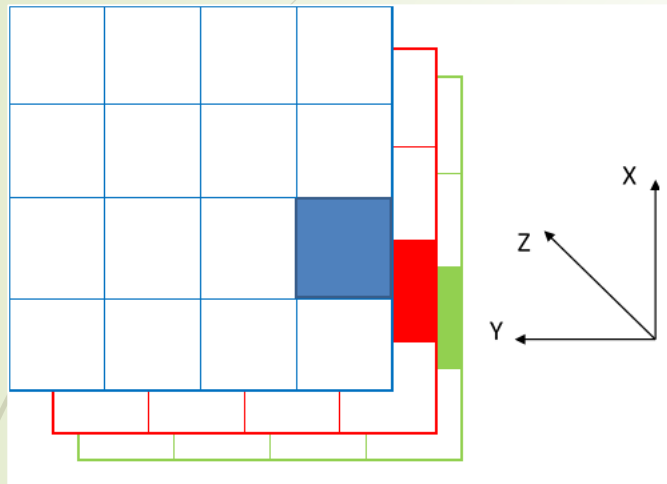
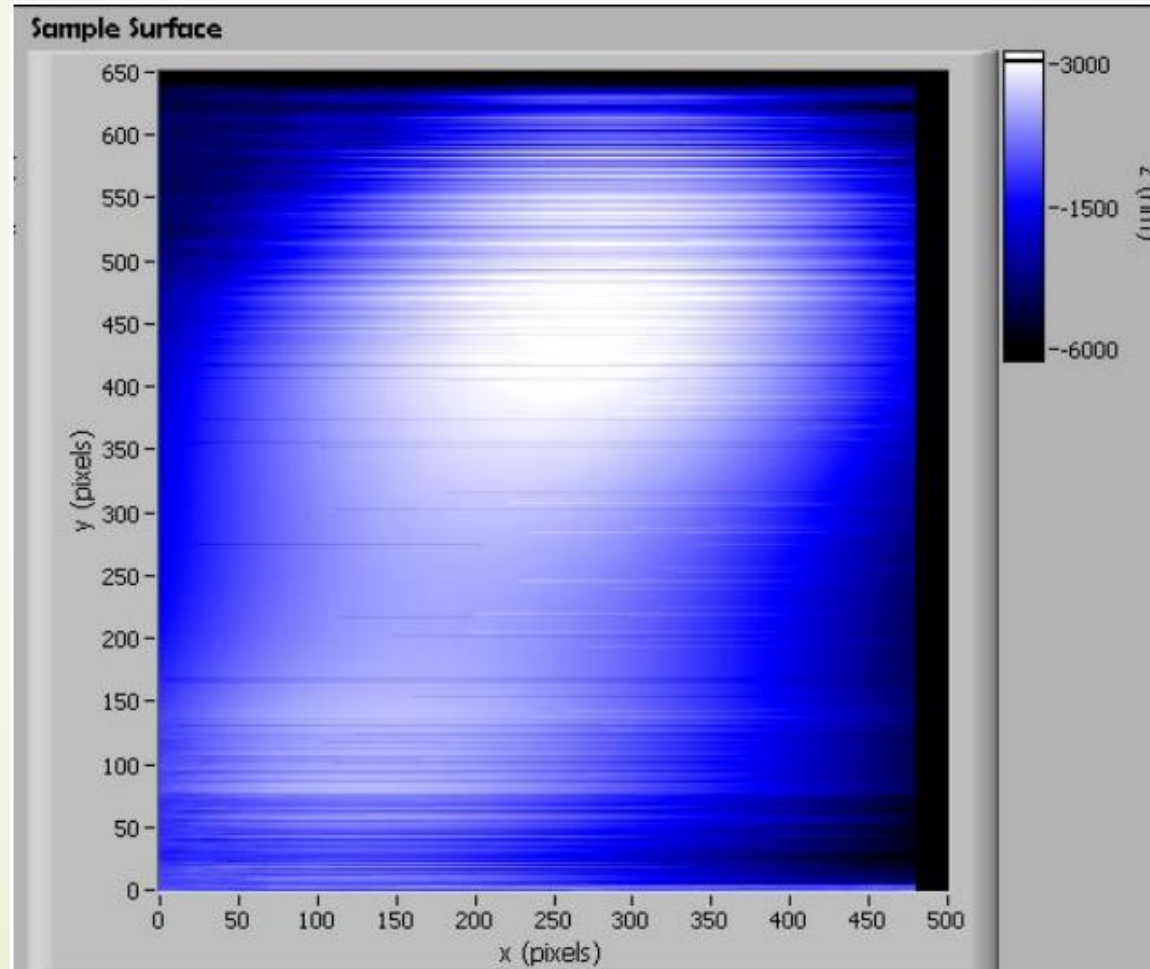


Image Analysis




Topographical Image



A red arrow pointing to the right, located at the top left of the slide.

Current Status

- 
- Several thin, curved lines in shades of brown and grey, originating from the left side of the slide and extending downwards.
- ▶ Image Stabilization
 - ▶ Mount beneath Houghton College Deposition Chamber
 - ▶ In-situ topographical image