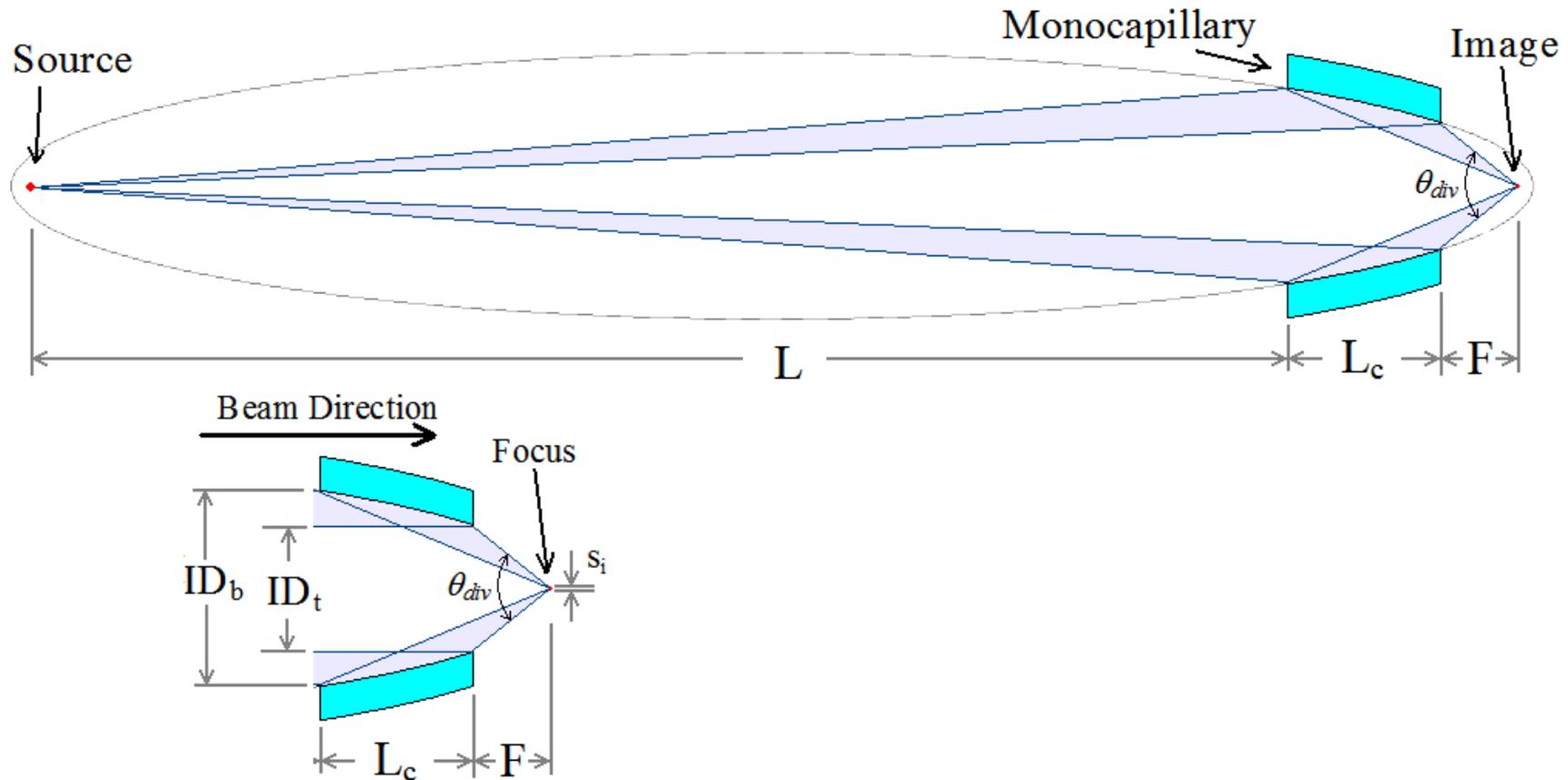# Vibration Reduction in X-ray Capillary Optic Fabrication
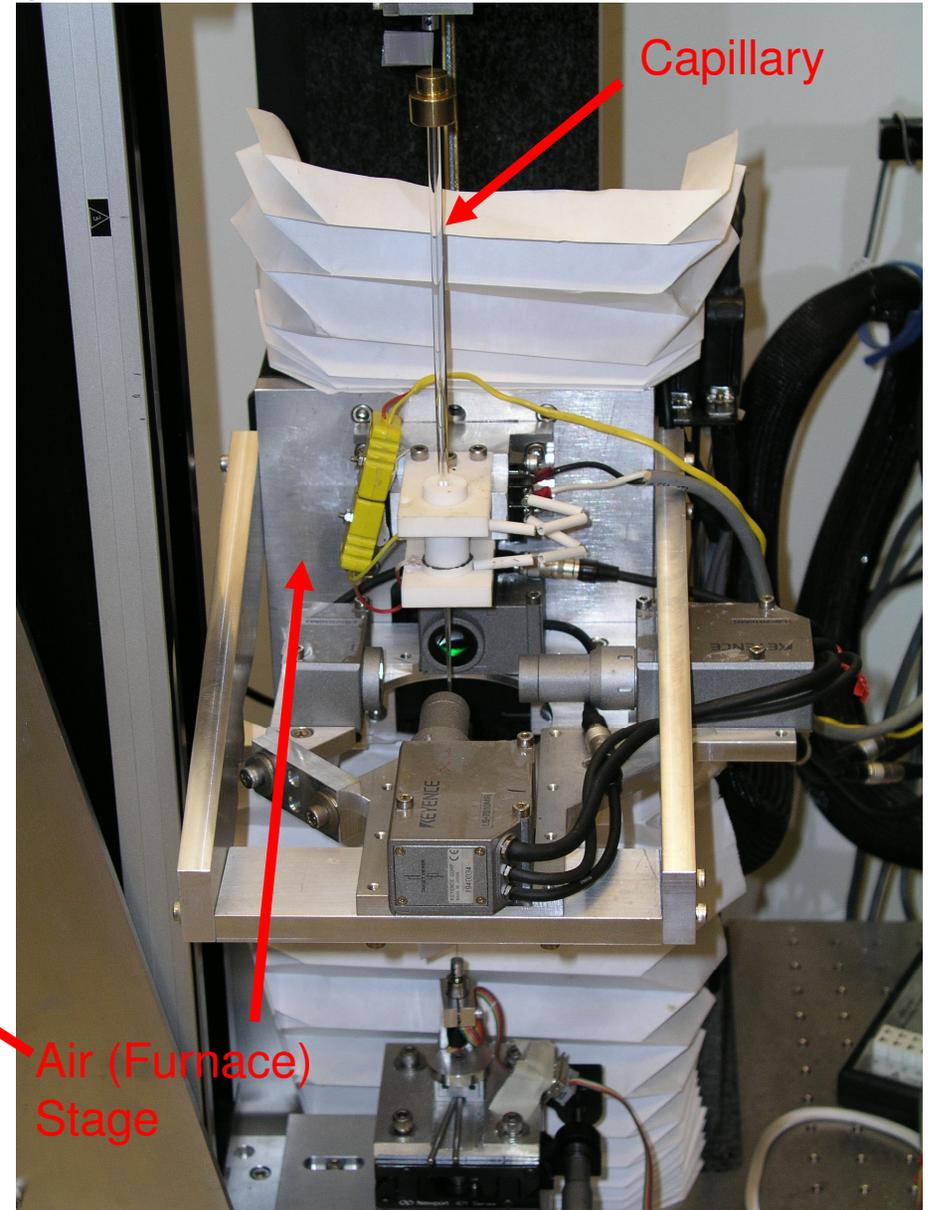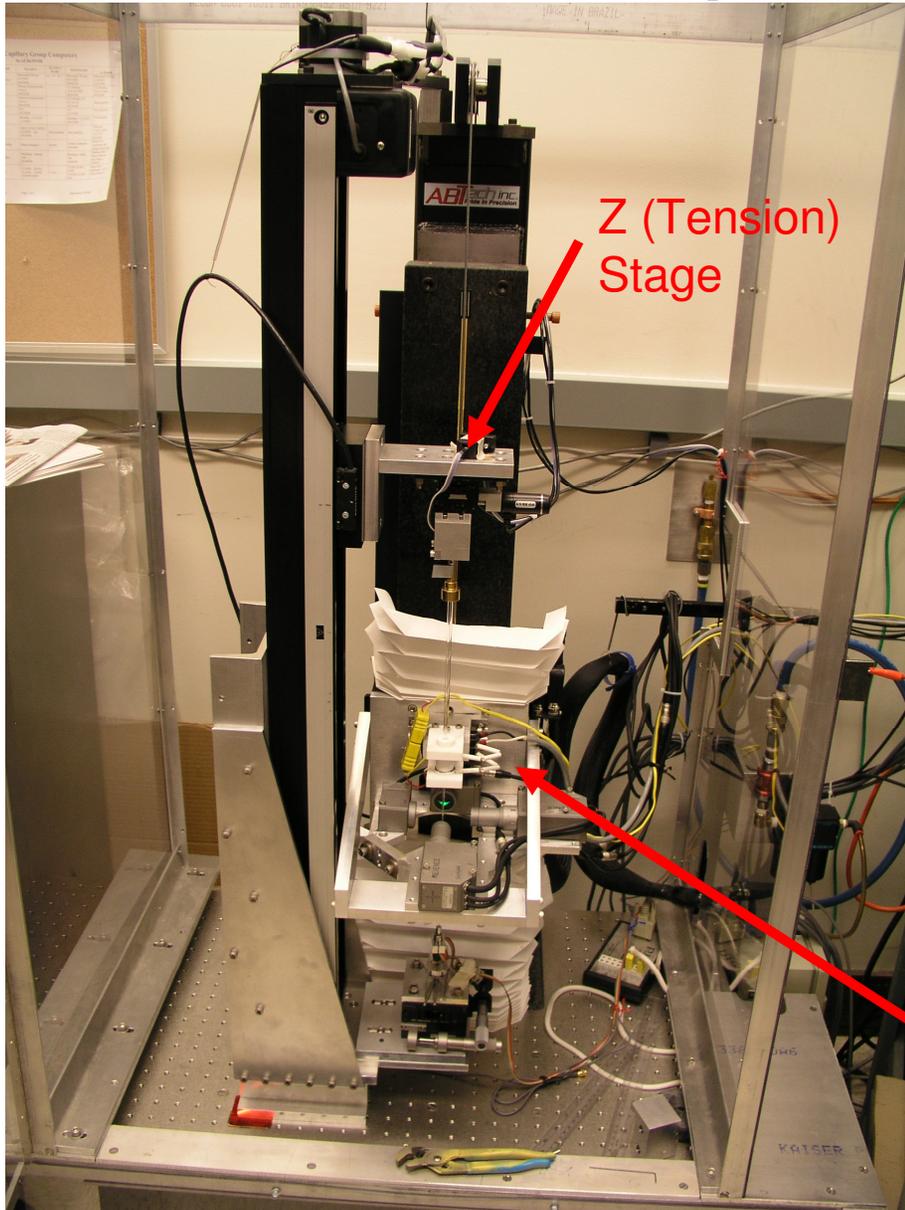
Justin Hugon, Don Bilderback, Tom Szebenyi

X-Ray Capillary Optics

- $\theta_c = 32 \text{ keV} / E_c *$ milliradians

Capillary Puller

Limits of Capillary Optics

- Ideal Capillary in ERL: ~10nm Spot Size
- Current Capillaries: ~10μm Spot Size

- Sources of Error
  - Slope Errors   Presently 50-100 μrad rms
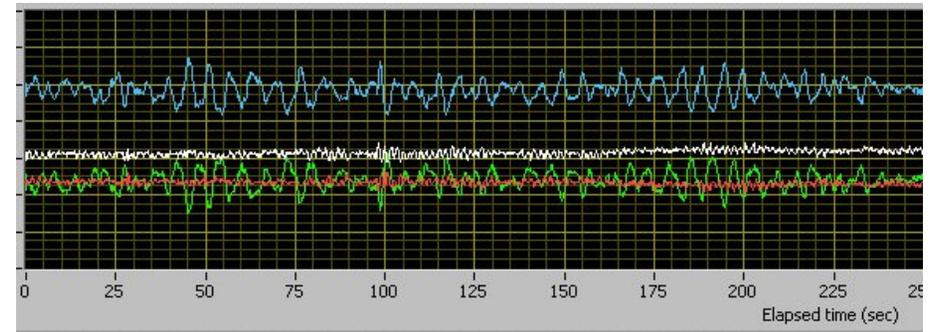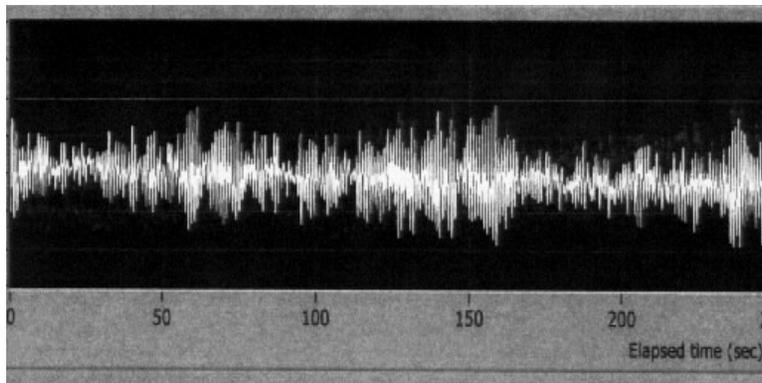 - Profile Errors   Presently 0.5-5 μm rms

Systematic Study of Vibrations

- Create a Controllable Vibration Source

- Make Baseline Measurements

- Improve Structural Design of Puller

- Make New Measurements

Before

After

I ←— One micron bar

Possible Methods to Mitigate Vibration

- Structural Crossbar
- Improved Capillary Mounting System
- Increase Mass of the Capillary Drawing Apparatus

Citations

- Sterling W. Cornaby- The Handbook of X-ray Single-Bounce Monocapillary Optics, Including Optical Design and Synchrotron Applications (2008)