



Advanced LIGO Core Optics Polishing and Coating Status

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Polishing Summary

- Polishing of 15 cm piece underway at CSIRO
 - » CSIRO reports that they have good control over the figure, though the high CG makes the part tend toward a spherical aberration.
 - » rms microroughness is currently ~ 2 Angstroms.
 - » Exploring the idea of using Ion Beam Etching for the compensating polish on side 2 of the 15cm x 8 cm sapphire piece.
- BFGoodrich (HDOS) is working on an RFQ to polish 25cm Sapphire
 - » Side 1: 5nm tolerance on sag (ROC), Surface rms < 0.8 nm over 200mm aperture
 - » Side 2 goal: compensate for inhomogeneity to < 10 nm rms over 200mm aperture
 - » Side 2 requirement: compensate for inhomogeneity to < 20 nm rms over same
 - » Initial estimate is a ~ 1 year program, requiring acquisition of a new measurement interferometer.
 - » Our polishing specification is more difficult than the window compensations they have done before, but they have a corporate interest in developing the technology.

Coating Status

- **Vendors Reviewed (in alphabetical order)**
 - » **Central Research Laboratory of Japan Aviation Electronics Industry**
 - » **CSIRO**
 - » **General Optics**
 - » **Laser Zentrum Hannover**
 - » **MLD**
 - » **REO**
 - » **Virgo Coasting Facility /Lyon**
 - » **Zeiss**

Research Coating Plan

- **Coating Research Objectives**

- » **Effects of coating on Q**

- » **Coating birefringence on sapphire substrates**

- » **Coating absorption**

Concern: Ability to test the multiple samples in a timely manner

LIGO APPROACH TO COATING RESEARCH

- Parallel and independent research at Lyon and MLD