Overview

- Opto-Mechanical Requirements
- Optical Layout and Folding
- Optical Bench and Support Structure
- Functional Blocks
- Filter Wheels
- Cold Pupil to Etalon Change
Opto-Mechanical Requirements

• Ease of alignment and maintenance over 5-10 year lifetime
• Provide a stable instrument support structure
  • $\leq 1/2$ pixel image shift during 20 minute integration
  • Centering repeatability to $\leq 5$ arcsec throughout a 180° rotation
  • Negligible change in image quality throughout a 180° rotation
• Provide light-tight baffling along optical path
• Field stop at telescope focal plane (warm)
• Suspended mass $< 500$ lbs. (estimated at 330 lbs.)
• Torque off rotator $< 1500$ lbs. (estimated at 1000 ft-lbs.)
• Provide support cart with electronics
Optical Layout

- Mirrors M1 and M4 rotate to select either the cold pupil or the Filter Wheel
- Mirrors M2, M2´, M3 and M3´ are stationary
- Length 1.22 m (48 inches) from telescope focal plane to focal plane array
- 0.81 m (32 inches) from field lens to focal plane array
- Width 230 mm (9 inches) between cold pupil and etalon centers
Optical Bench and Support Structure

- Support structure based on Ohio State’s G10 ring design
  - OSIRIS, TIFKAM, ANDICAM and FLAMINGOS use this design
  - CTIO version of NIC-FPS was to use this design
  - G10 ring fabricated of layers of 1/32 inch sheet wrapped over a mandrel and epoxied together

- Optical bench is cantilevered
  - Flexure ~10 arcsec from to vertical horizontal
  - FLAMINGOS flexes 44 µm over its 870 mm length
  - Optical alignment is independent of dewar shell

- Optical bench provides a long, wide flat surface (up to 32 x 12 inches)
NIC-FPS Functional Block Diagram
Filter Wheels

- 2 x 10 slots filter wheels provides up to 18 slots for filters and 2 open slots
- Outer Diameter ~ 315 mm (12.4 inches)
- Nominal filter size 65 mm dia. x 5 mm thick, 5° tilt
- Face loading for easy insertion and removal
- < 90 seconds for full rotation, ~ 10 seconds between slots
- Direct filter position readout.
  - Binary readout of 4 microswitches when filter is in position
Cold Pupil to Etalon Mode Change

- Rotate M1 and M4 to select modes
- Direct detent readout on M1 and M4
- < 90 seconds access time between modes
- Image repeatability of $\leq 5$ arcsec. when returning to a given mode
- Image shift of $\leq 30$ arcsec. between modes
Under Review

• Lens, Mirror and Filter mount designs
• Cold pupil alignment technique

ARC Input

• Centering tolerances
• Flexure