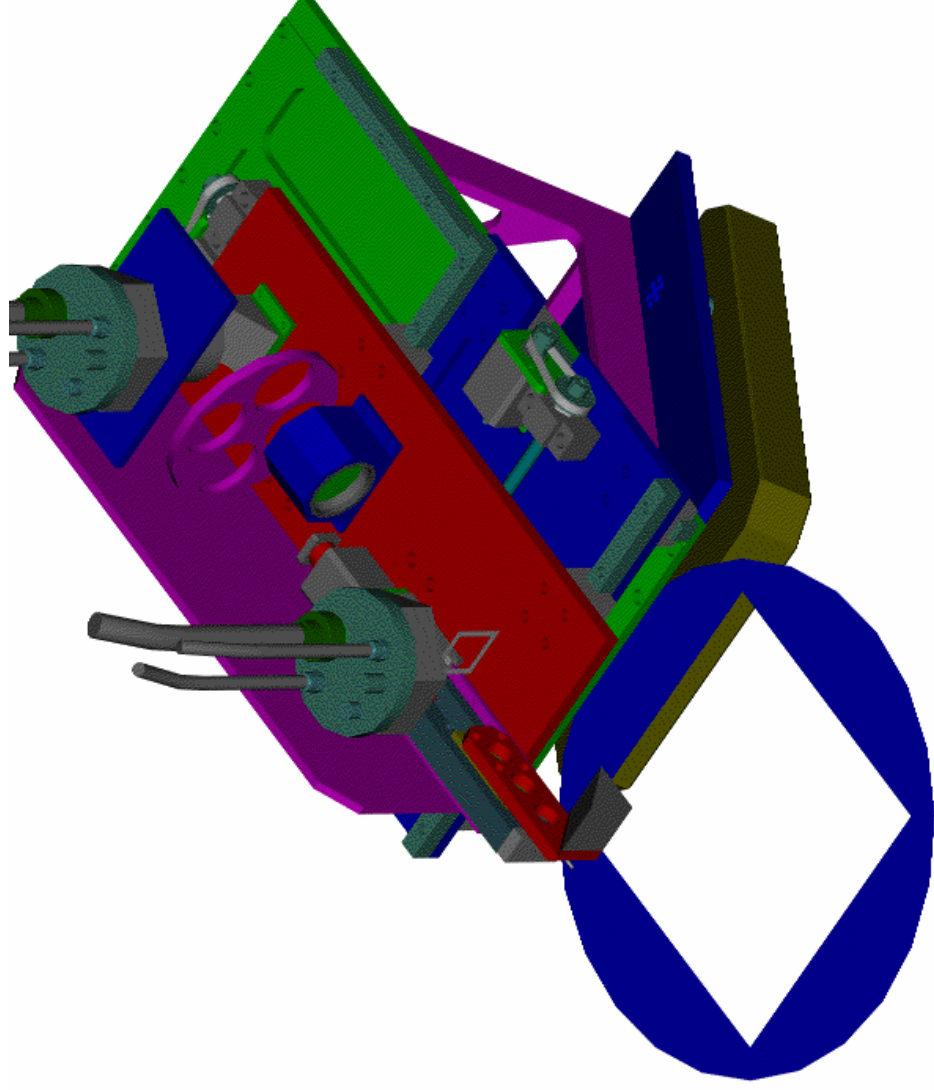




MODS AGW Stage Progress Report

Tom O'Brien
2004 May 26

MODS AGW Stage



MODS AGW Stage

General Requirements

Optical Design

- Guide Channel Optics & Camera
- Wavefront Sensor Optics & Camera

Mechanical Design

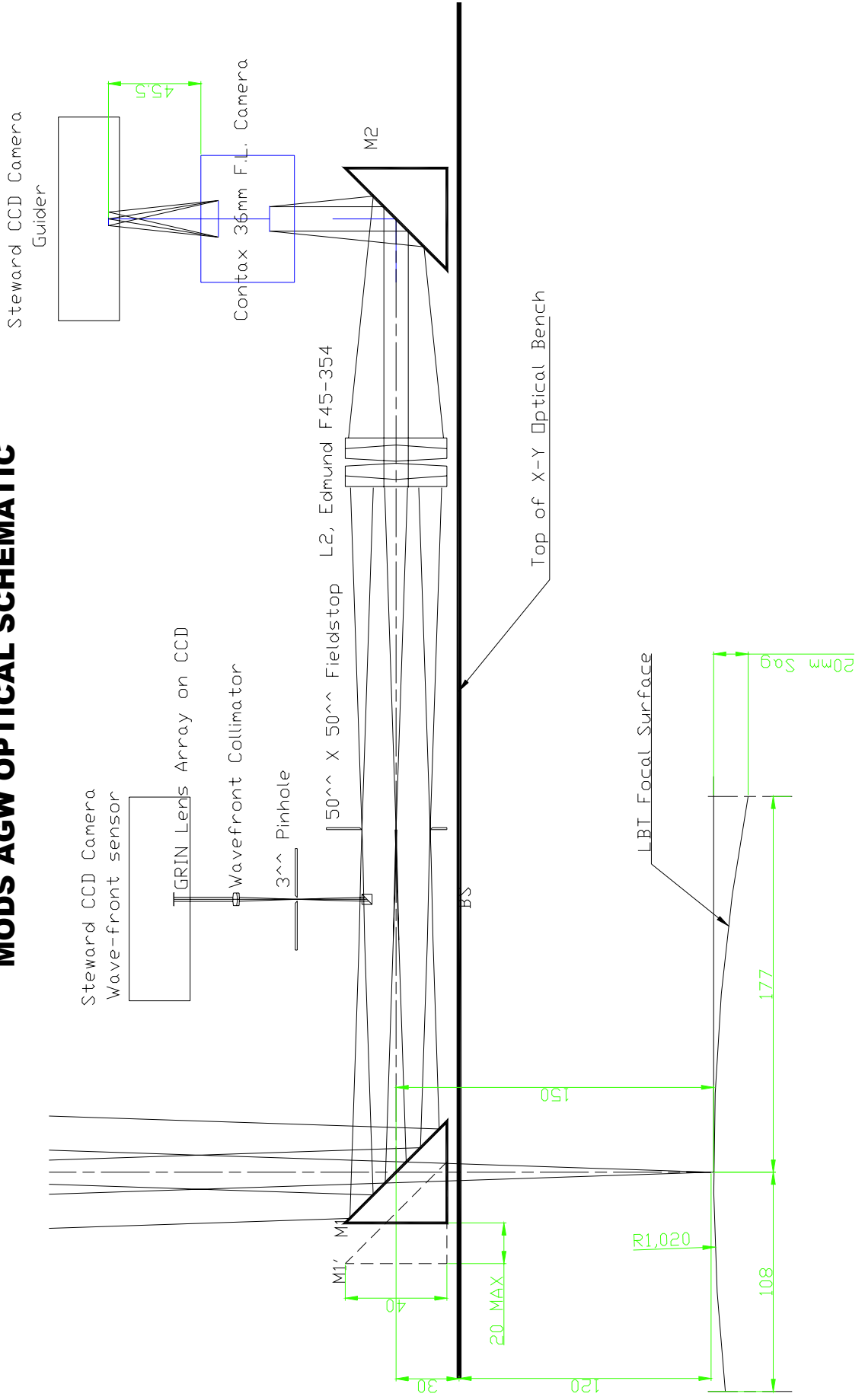
- X-Y Stage Designs
- Focus Stage
- Filter Wheel

MODS AGW Stage

General Requirements

- Guide on a 18th magnitude star at 10Hz. sampling rate, S/N ~ 30
- Use a 18th magnitude star for wavefront sensing with 30 second integration
- Access the center of the science field and 1.25[^] x 5[^] off axis guide/wavefront field
- Do we need a calibrator for the wavefront sensor?

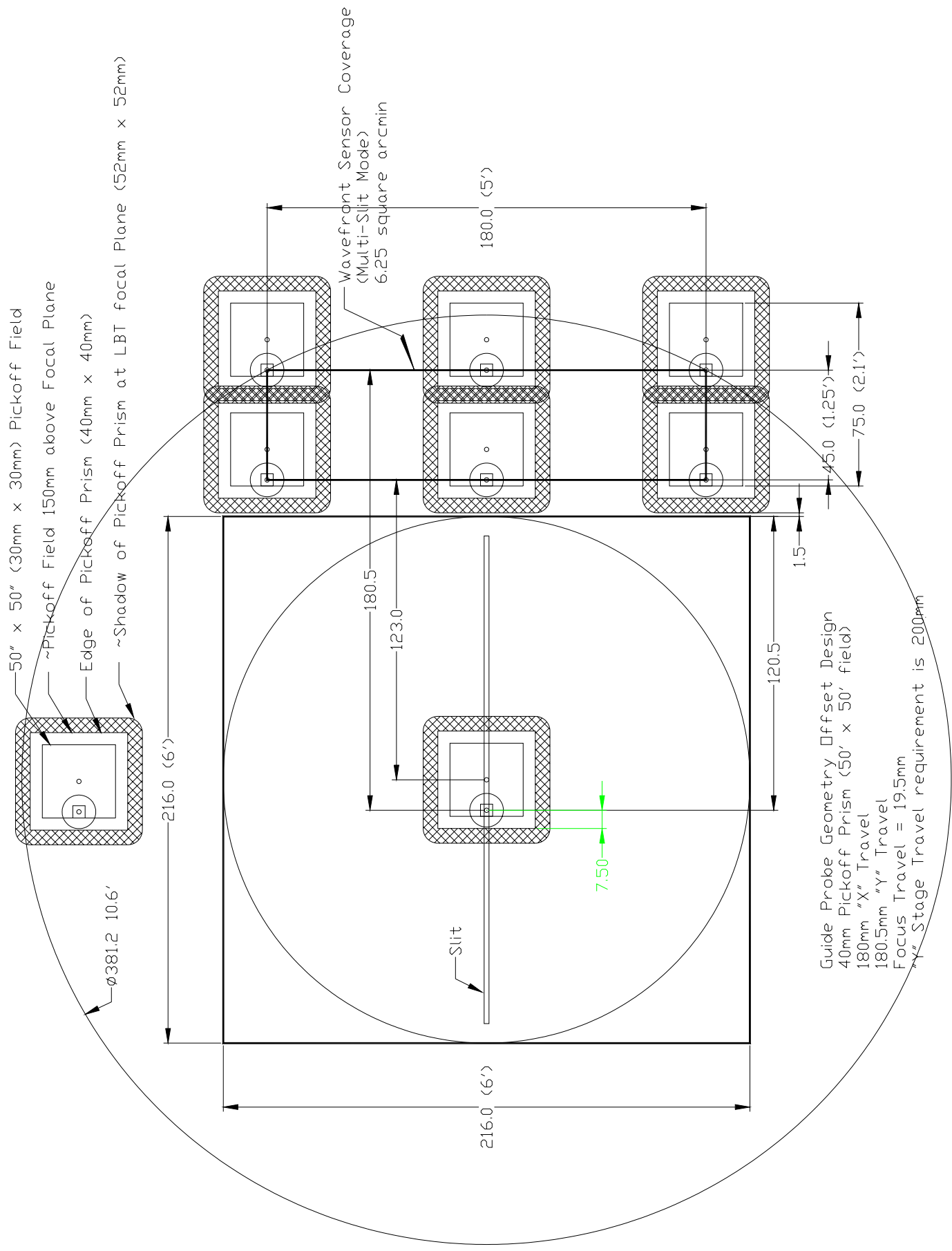
MODS AGW OPTICAL SCHEMATIC



MODS AGW Stage

Above Slit General Specifications

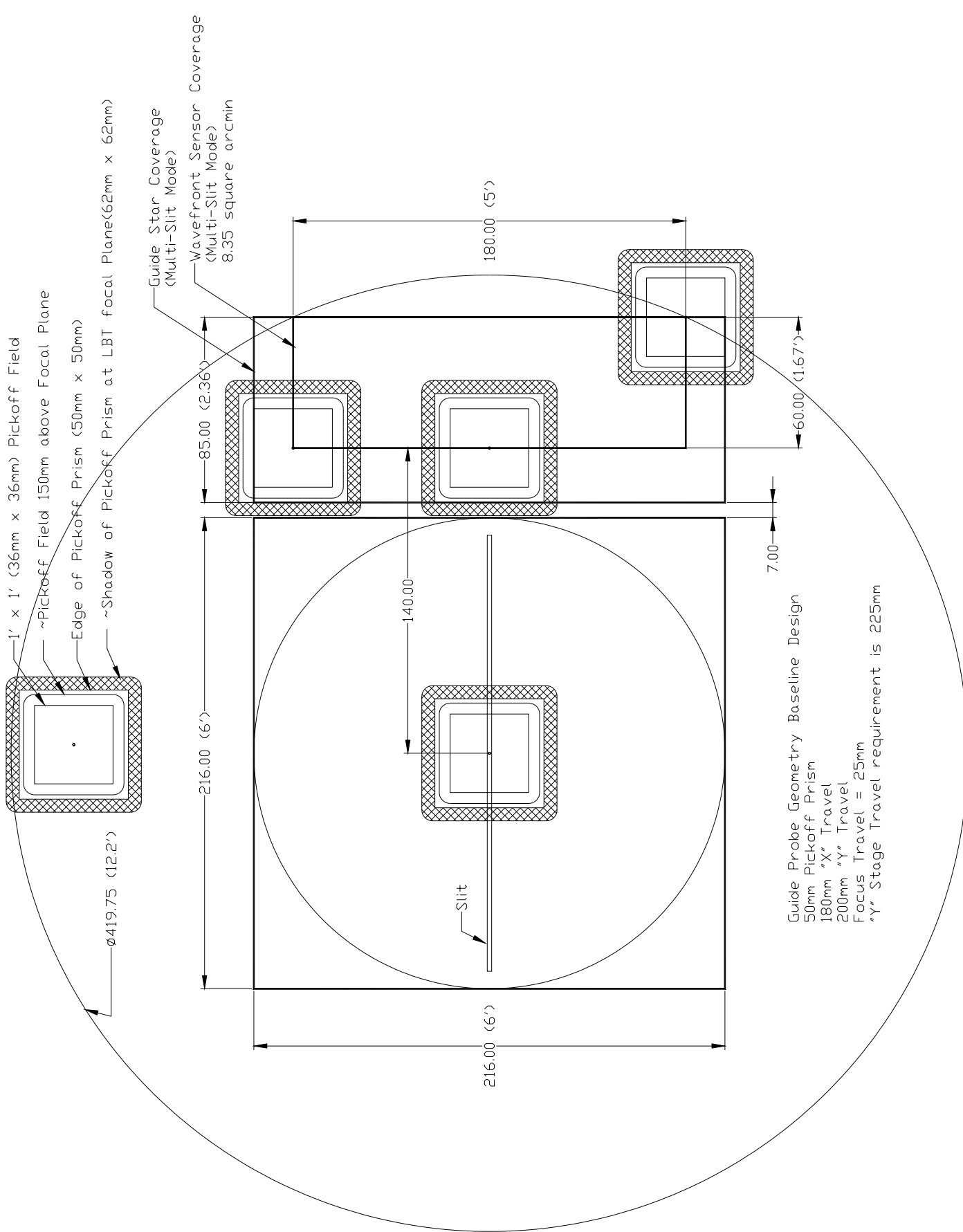
- 50" x 50" Pickoff Guide Field
- 40mm x 40mm Guide Pickoff prism
- Pickoff is ~ 150mm above the LBT Focal Sphere
- 2.1' x 5.8' Guide Star Scan Area
- 8" x 8" Wavefront Pickoff Beamsplitter
- 5mm x 5mm Wavefront Pickoff Beamsplitter
- 1.25' x 5' Wavefront Star Scan area



MODS AGW Stage

Offset Wavefront Pickoff Beamsplitter

- Places off-axis wavefront scan area closer to science field
 - Reduces Y stage travel requirement
 - Gets better image quality on guide/wavefront stars
- Allows placement of wavefront sensor very close to center of science field
- Most of guide field is unattenuated by wavefront beamsplitter



MODS AGW Stage

Guide Channel Optics & Camera

- Edmund 176mm Focal Length collimator produces a 12mm pupil
- Zeiss 36mm F.L. camera lens, f3,
- Guide Camera Scale
 - 0.12mm/arcsec
 - 0.11 arcsec/pixel

Camera: Steward CCD

- Marconi 512 x 512 x 13micron pixels
- Frame transfer device

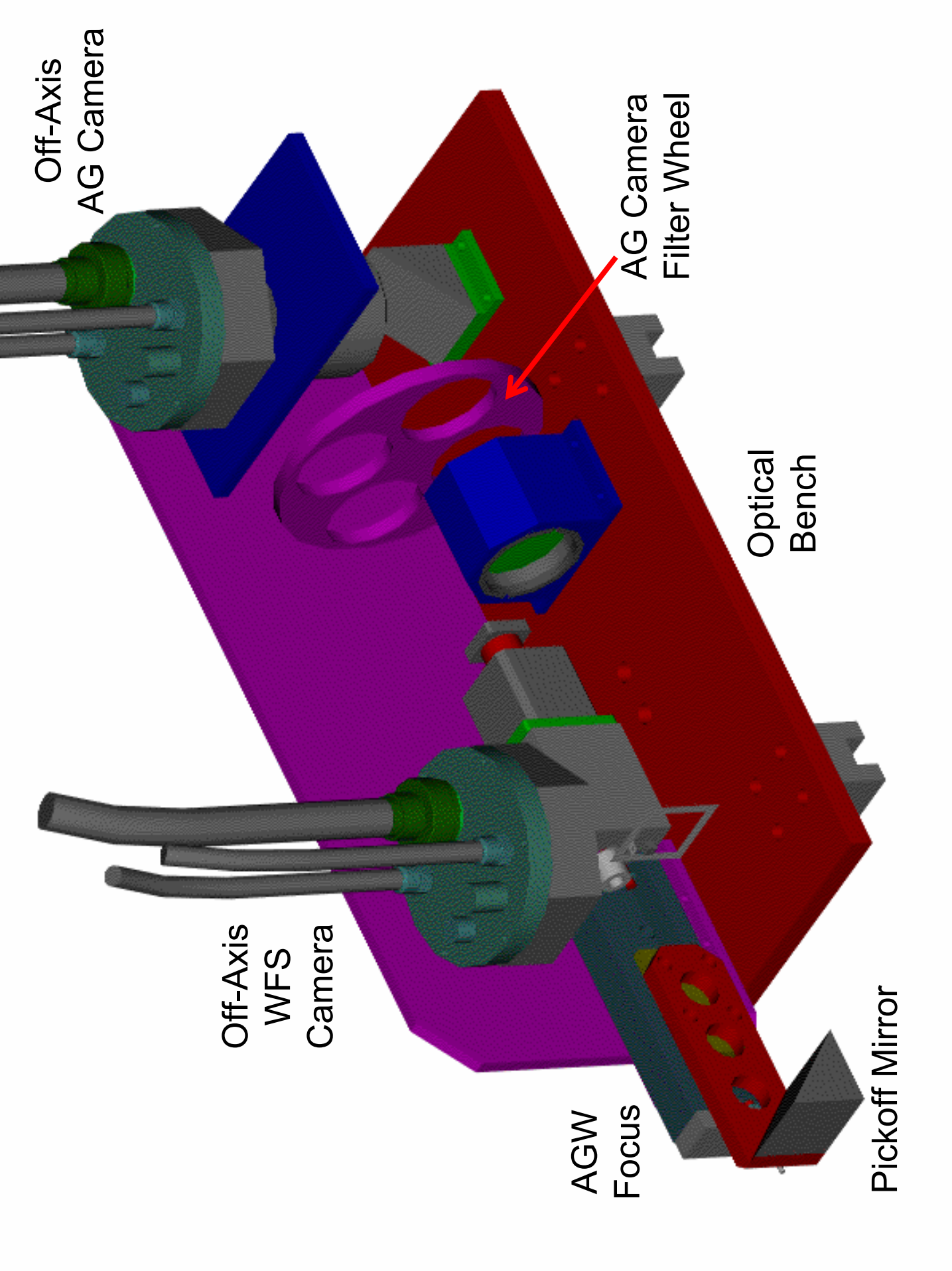
MODS AGW Stage

Wavefront Channel Optics & Camera

- Edmund 30mm Focal Length collimator produces a ~2mm pupil on face of GRIN Array
- Wavefront camera is a 12 x 12 GRIN Array bonded on CCD
 - 12 x 12 sub-apertures on pupil (1.87mm 1.87mm GRIN)
 - 12 x 12 pixels per sub-aperture
- Magellan uses only the 18 x 18 “fine” sampling

Camera: Steward CCD

- Marconi 512 x 512 x 13micron pixels
- Frame transfer



Off-Axis
AG Camera

AG Camera
Filter Wheel

Optical
Bench

Off-Axis
WFS
Camera

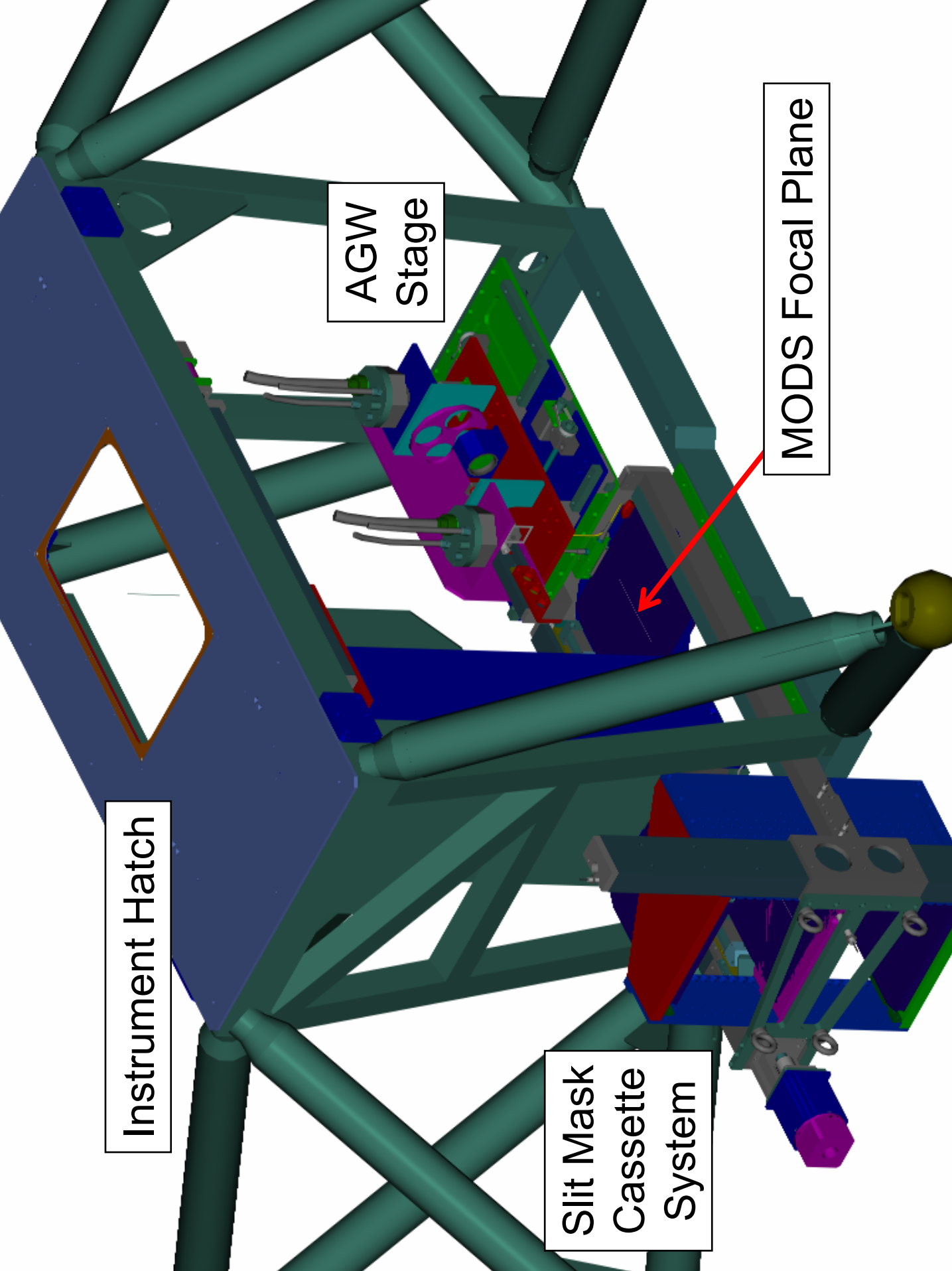
AGW
Focus

Pickoff Mirror

MODS AGW Stage

Mechanical Requirements

- Very low differential motion between guide image, slit, and IMCS collimators
- Short load paths between AGW, Multislit, IMCS
- Very stiff and compact X-Y stage for pickoff mirror



Instrument Hatch

AGW Stage

Slit Mask Cassette System

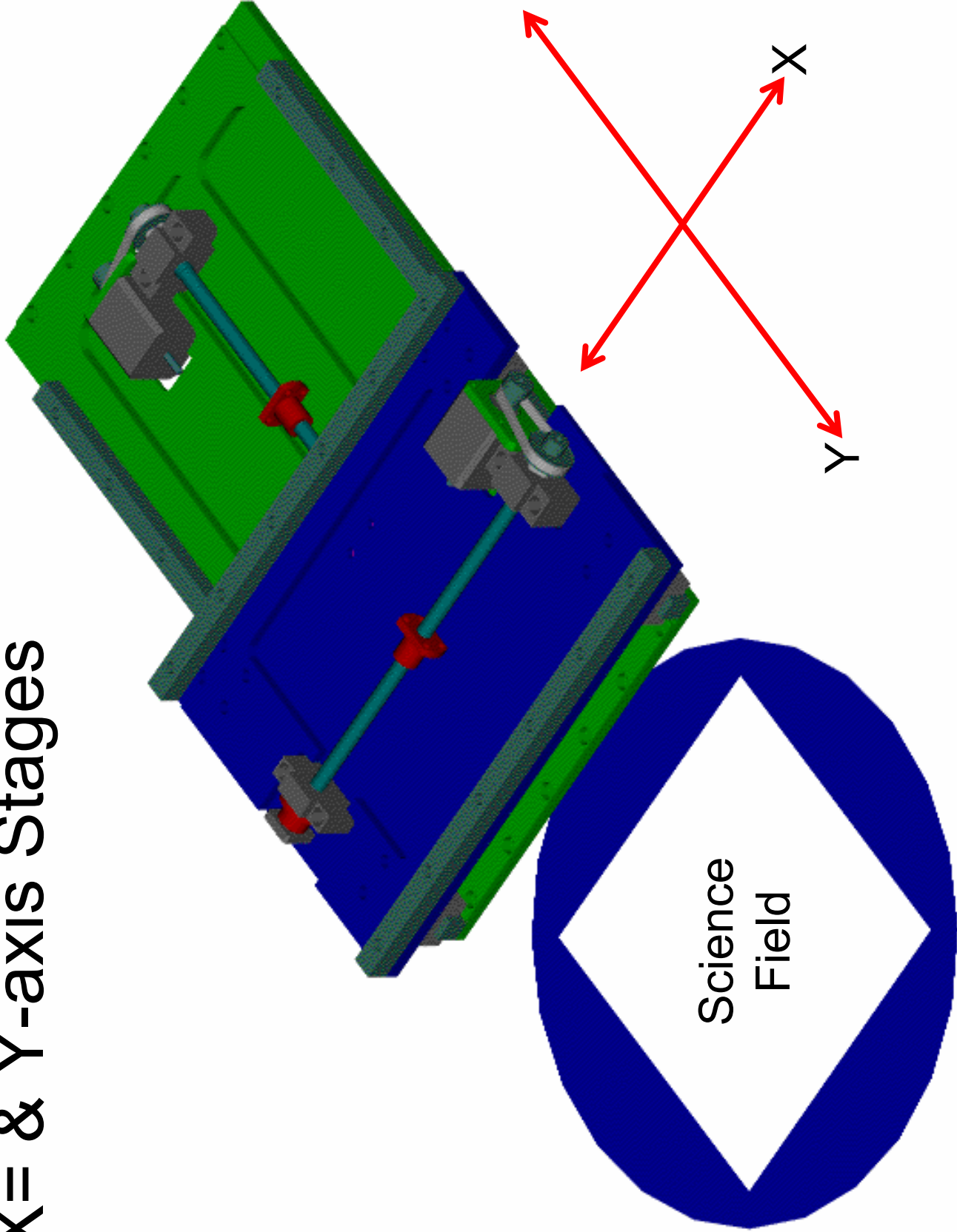
MODS Focal Plane

MODS AGW Stage

Mechanical Stages

- “X” Stage travel = 180mm (perpendicular to slit)
- Limited by red beam interference and Blue grating turret interference
- “Y” Stage travel = 200mm (parallel to slit)
- 180.5mm travel reaches center of science field and edge of guide field
 - 19.5mm travel to compensate for sag of curved focal sphere

X= & Y-axis Stages



MODS AGW Stage

Mechanical Stages

- THK Linear Bearings
- THK 2mm Pitch Ballscrews
- 2:1 Belt reduction
- Failsafe brake for position maintenance
- Home and limit sensors
- Folded design for compact packaging

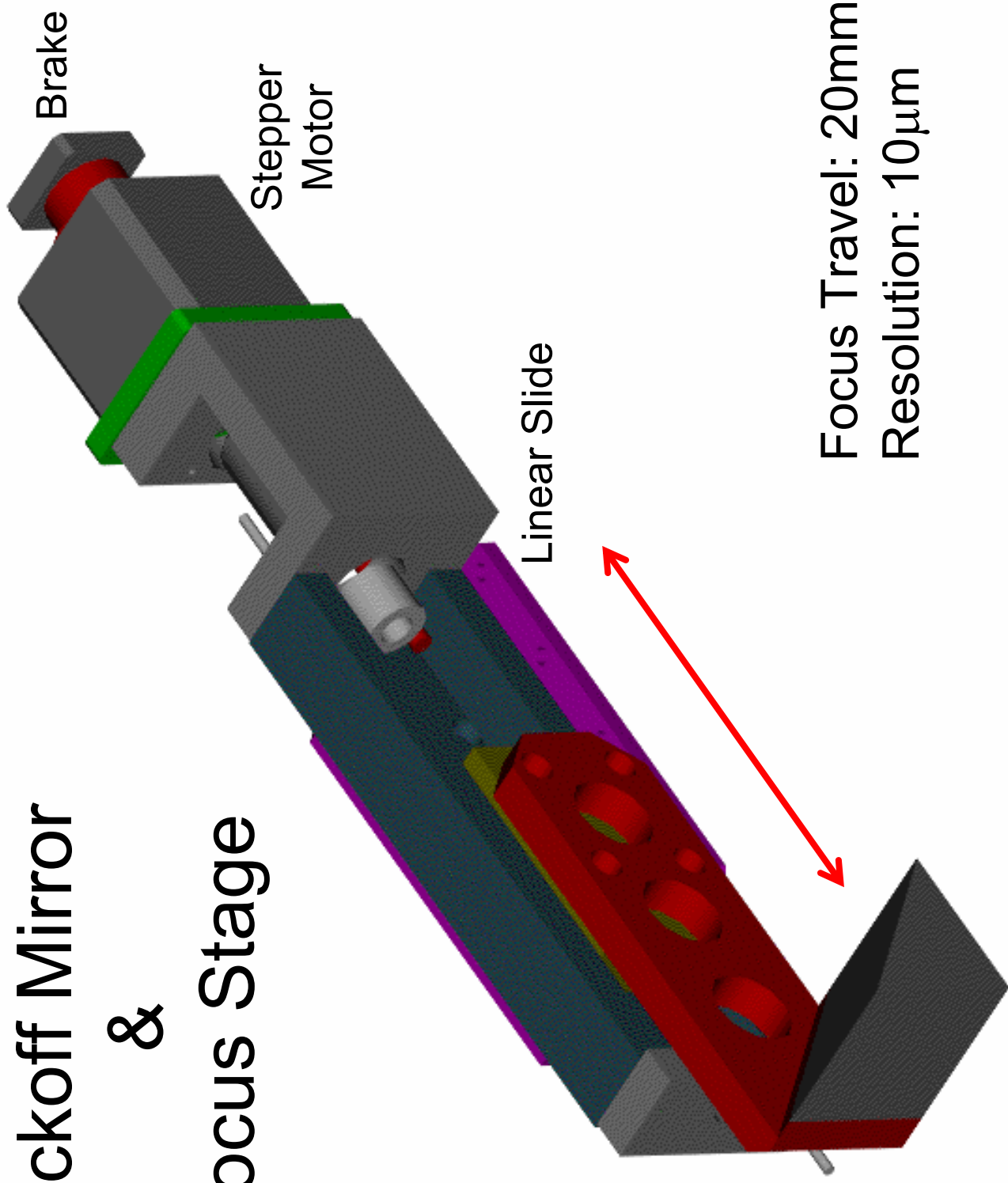
- 5micron linear resolution
- 20 second corner to corner move time

MODS AGW Stage

Focus Stage, 23mm Max travel

- THK KR 26 Linear Slide
 - 2mm Pitch Ballscrew
 - Direct Drive step motor
 - Failsafe brake for position maintenance
 - Home and limit sensors
-
- 10micron focus resolution
 - 5 second limit to limit move time

Pickoff Mirror & Focus Stage



Brake

Stepper
Motor

Linear Slide

Focus Travel: 20mm
Resolution: 10 μ m

MODS AGW Stage

Filter Wheel

- 4 position wheel
- 50mm or 2" filters (ANDICAM cells)
- Position encoding sensors
- Mechanical detent for position maintenance