

CTA-US Alignment Autocollimator

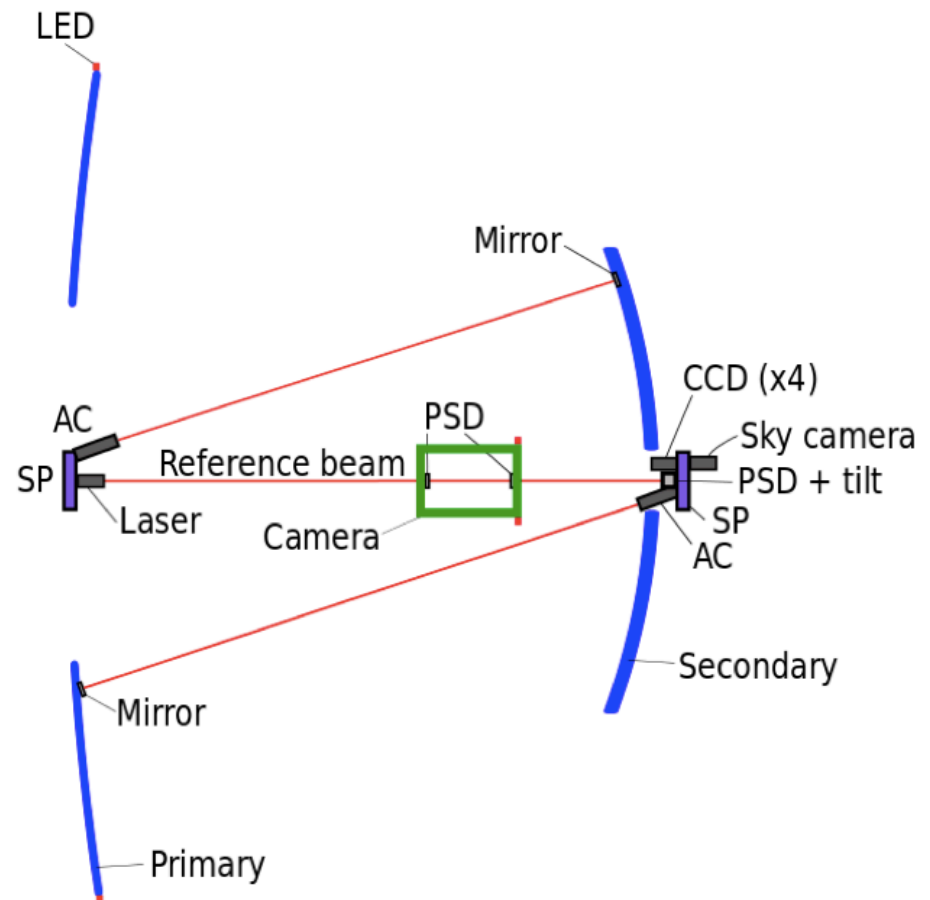
Phil Kaaret and Scott Griffiths

The University of Iowa

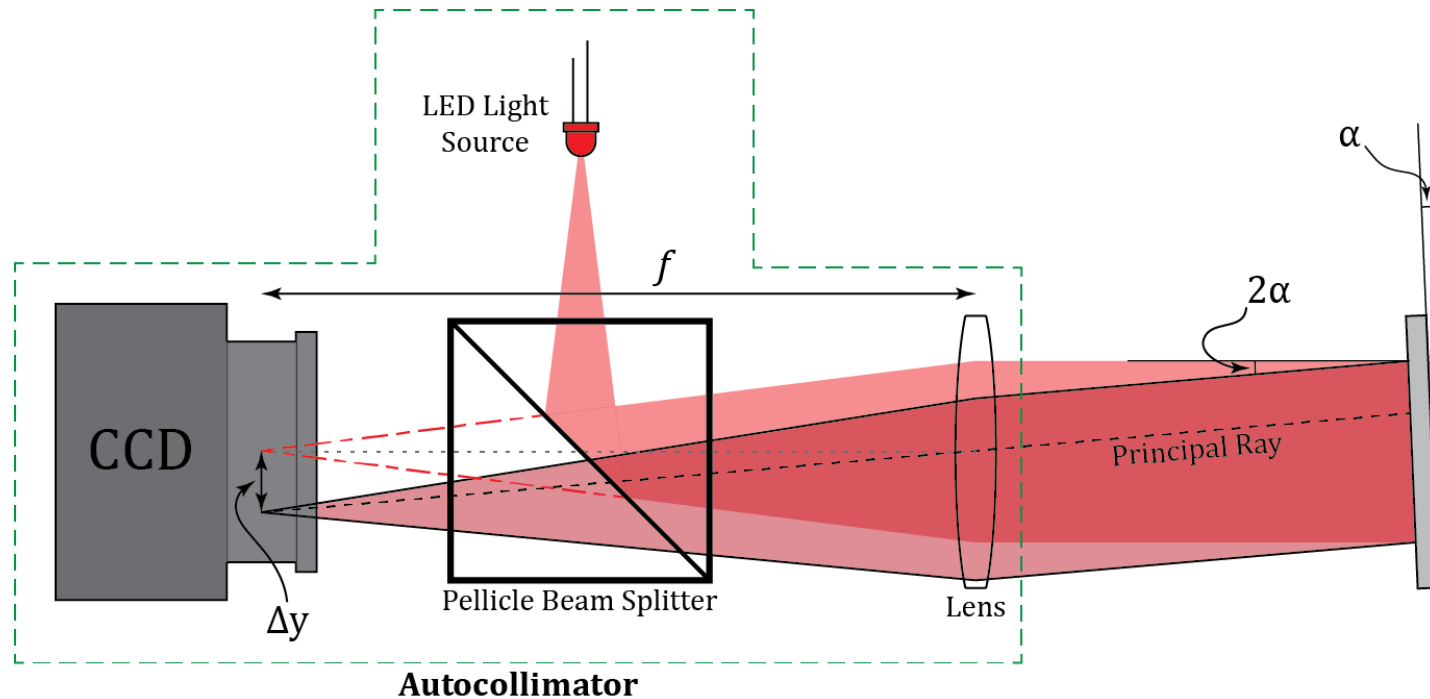


Alignment Overview

- CTA Requirement of 5'' source centroid
- Autocollimators to measure angular tilt
- LED + Cameras to measure displacement
- Reference beam is UCLA's

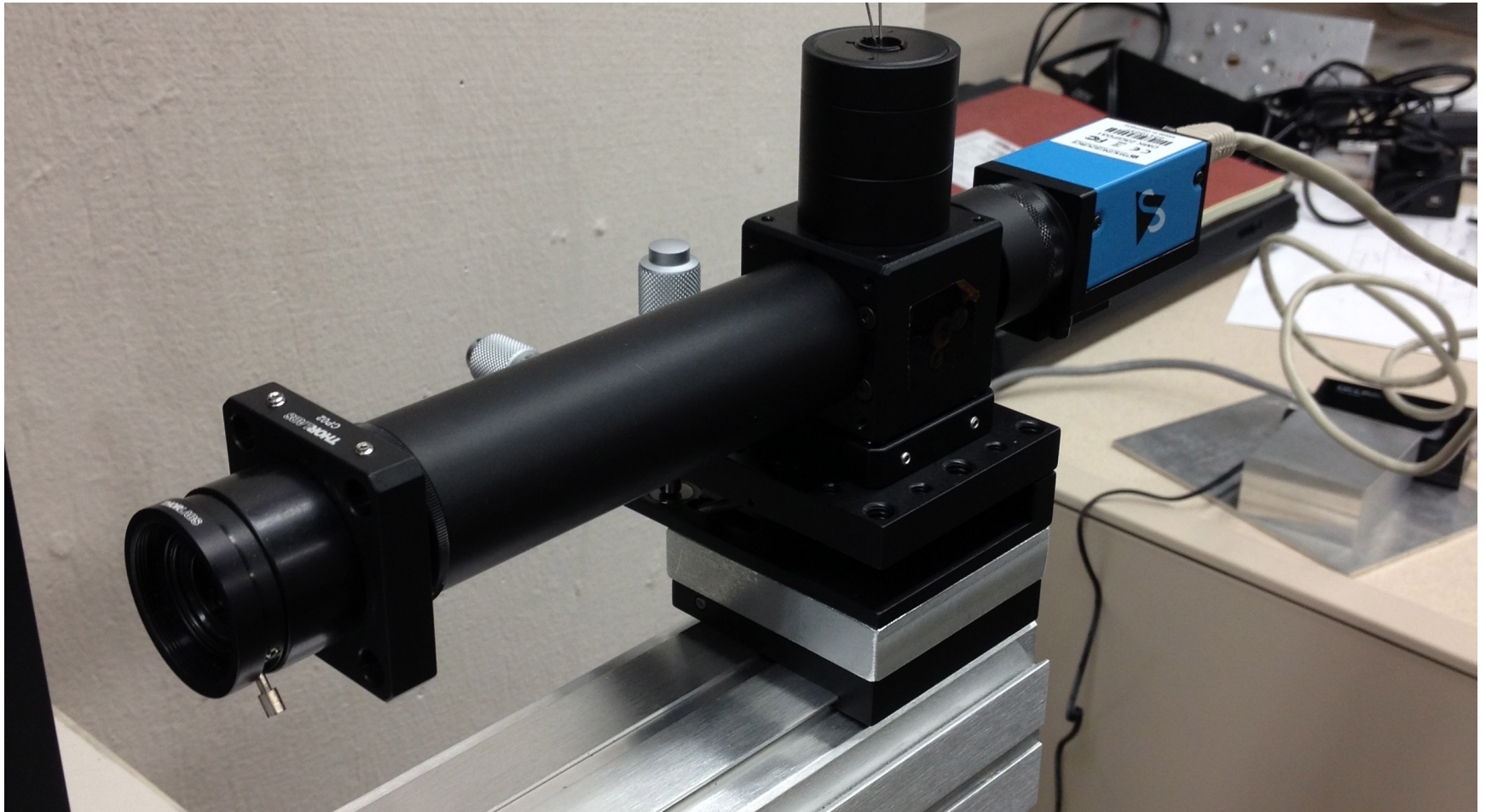


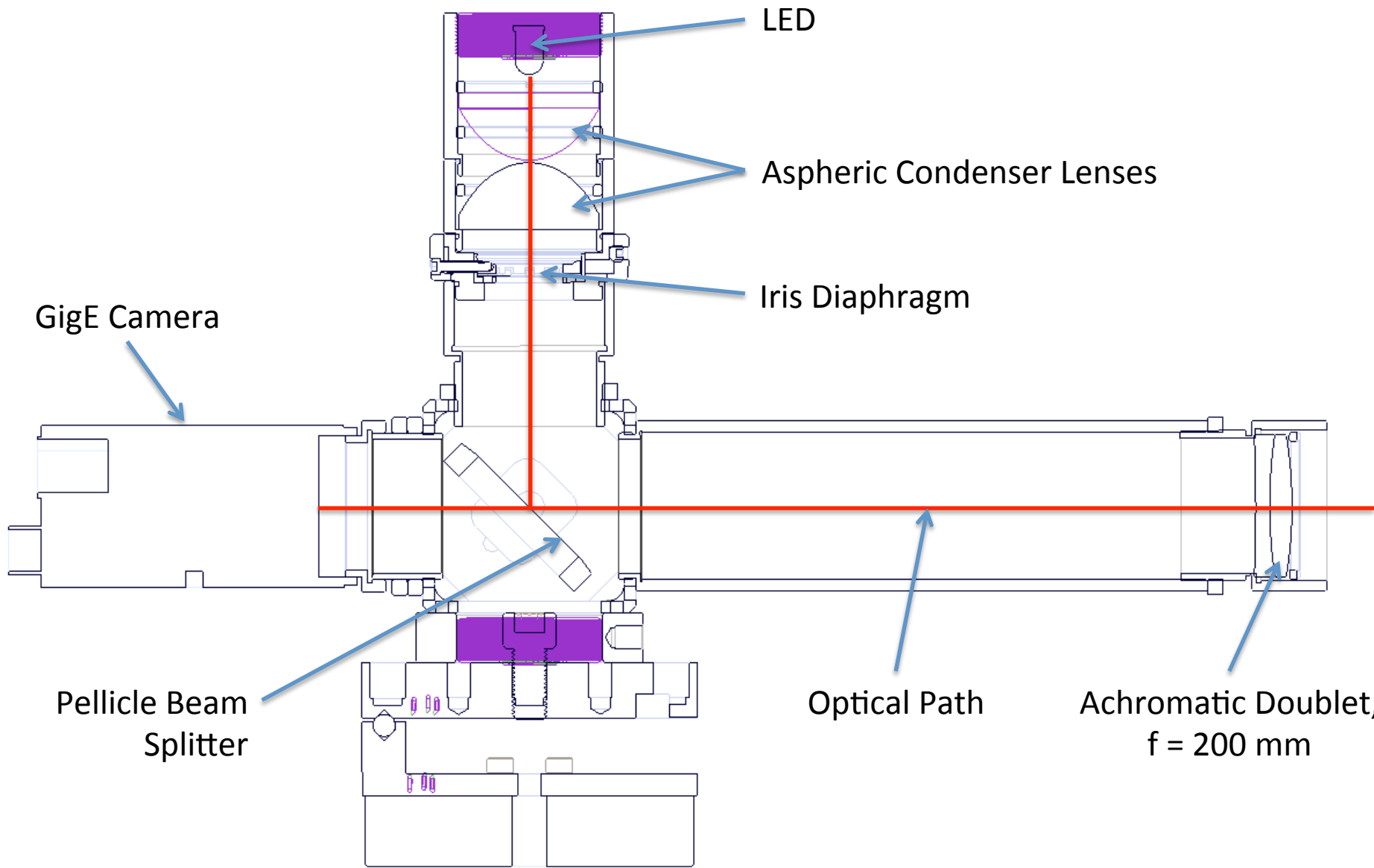
Autocollimator Principle of Operation



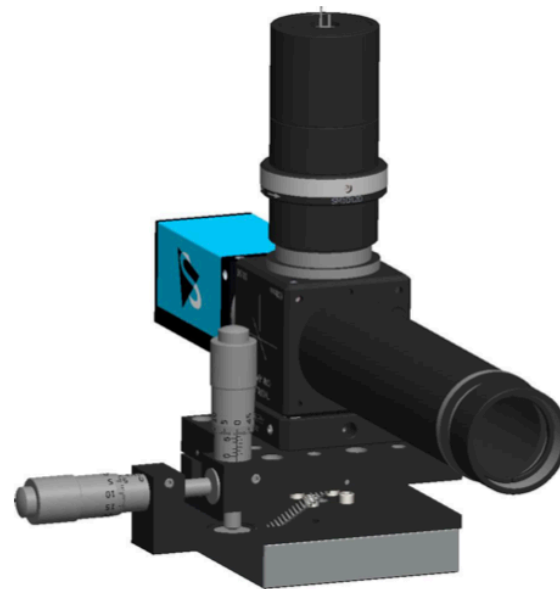
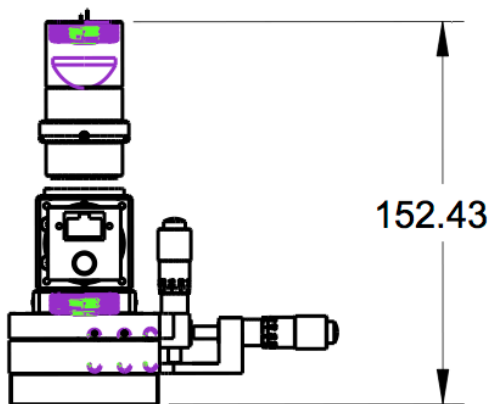
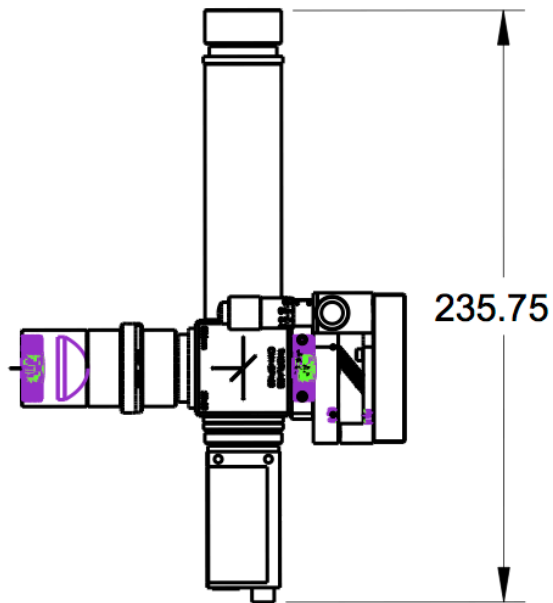
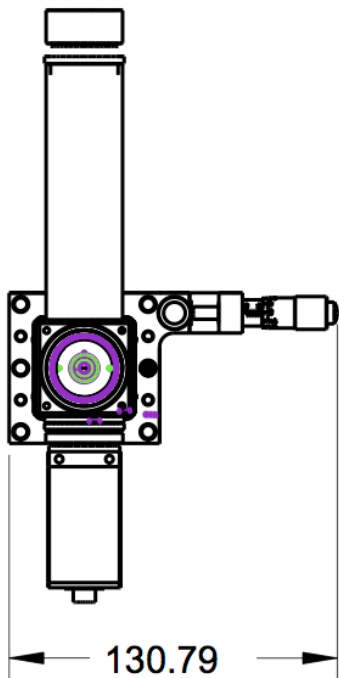
- 2" diameter mirror located ~ 8 m away
- Pellicle beam splitter used to minimize beam offset
- Need to measure x,y angular offsets < 0.07 mrad ($\sim 14''$)

Lab Prototype





MODEL NAME TITLE
CAMERA_CALIB_ASM



Dimensions in mm

		DRAWN BY	DATE
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UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS. TOLERANCES ARE +/- 0.1MM +/- 1° DO NOT SCALE	TITLE		
	PROJECT	MODEL NAME CAMERA_CALIB_ASM	ISSUE

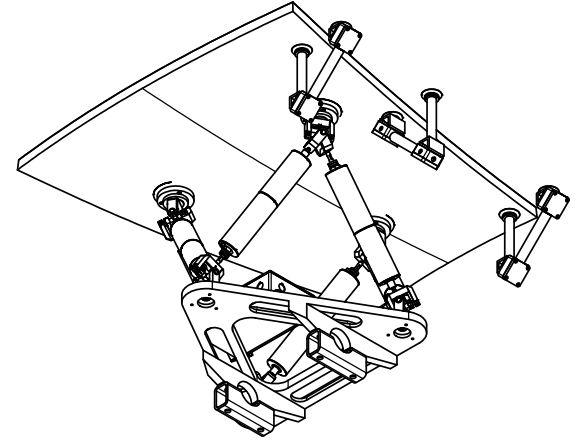
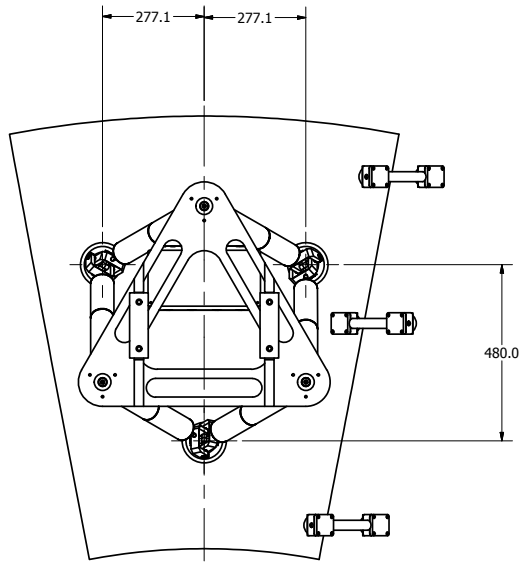
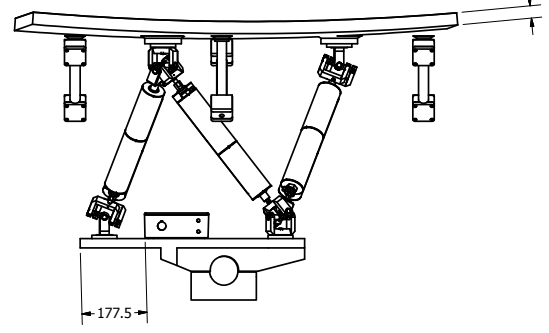
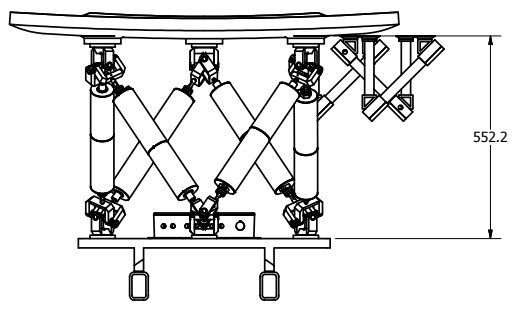
Autocollimator Interfaces

- Electrical
 - One ethernet connection (no PoE)
 - 120VAC power
- Mechanical
 - Mounting pattern on stewart platform TBD
 - Share enclosure with other stewart platform instruments
 - Require window in enclosure

Reflecting Surface

- Option #1:
 - Use telescope mirror surface
 - Can we place autocollimator on stewart platform (or elsewhere) where telescope mirror is normal?
- Option #2:
 - Mount 2" diameter mirror assembly on telescope mirror
 - Assembly can be mounted in front of telescope mirror, or behind

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	CTA-8	YOKE ASSEMBLY
2	3	JointAssembly-Mirror1	YOKE ASSEMBLY
3	6	ACTUATOR ASSEMBLYver1	ACTUATOR ASSEMBLY
4	1	CTA-10-14-1-SecondaryOuter Base	
5	2	CTA-10-13-2	Restraint
6	1	S-Outer-Segment1	
7	1	VV1-MirrorPanelCtrlBox-Rev 4	
83.4	3	MPES203	



SYM	CHANGE	BY	CHKD	DATE	APVD	DATE

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE INCHES

.X ± .1
 .XX ± .01
 .XXX ± .005
 ANGULAR TOL ± 1/2°

REMOVE ALL BURS AND SHARP EDGES DIMENSIONS TO BE IN ACCORDANCE WITH LATEST ASME B46.1 DIMENSIONS & TOLERANCES TO ACCORDANCE WITH LATEST ASME Y14.50

CAD NUMBER CTA-10-14-SP-SecondaryOuter1.iam			
DRAWN BY vjg	DATE 06/2013	SP LEADER	DATE
CHECKED		PROJECT MGR	
RESPONSIBLE ENGINEER		APVD/RELEASED	
MATERIAL		WorkInProgress	

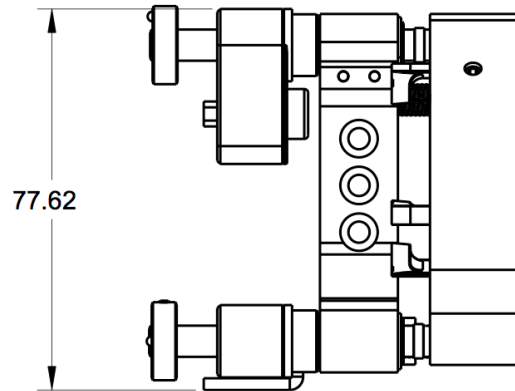
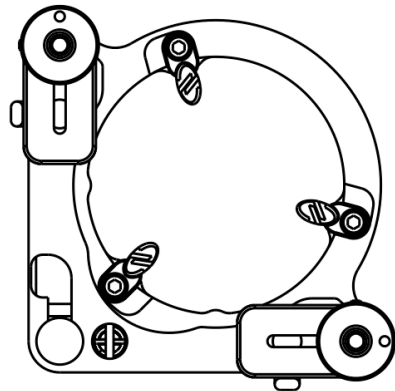
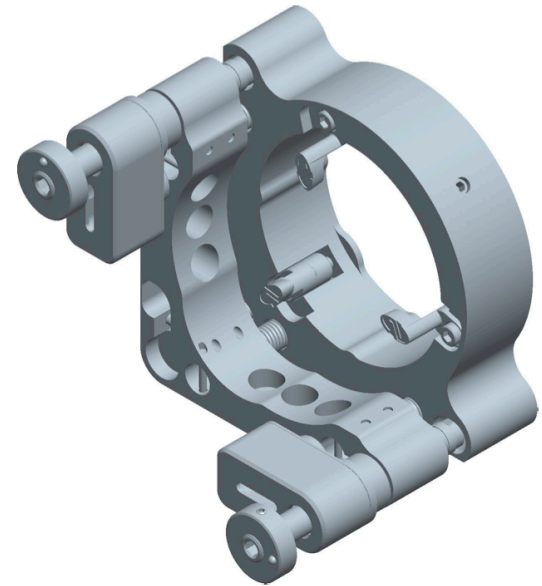
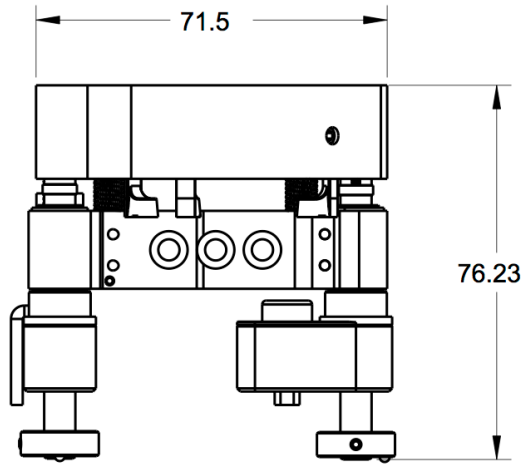
ITEM NO.	NEXT ASSEMBLY	REQD.
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DOCUMENT TITLE Outer Secondary Mirror Assembly	PROJECT NO.	
PROJECT TITLE:	DRAWING NUMBER	
SCALE	SHEET	REV
	OF	CTA-10-14

Mirror Mount

- 2" diameter mirror
- Newport 8822-AC picomotor mount
- 0.7 μrad angular res.
- $\pm 5^\circ$ angular range
- Ethernet controller
- Open or closed loop



MODEL NAME
NEWPORT_8822-AC



Dimensions in mm

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TITLE				
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS. TOLERANCES ARE: ±0.1MM-±0.1°			PROJECT	MODEL NAME NEWPORT_8822-AC
DO NOT SCALE			ISSUE	

Mirror Mount Interfaces

- Electrical
 - One ethernet connection (no PoE)
 - 120V power
- Mechanical
 - Need to decide how to mount the reflector assembly onto the telescope mirrors

LED Mounting

- Need to mount LEDs on camera
- Need to mount LEDs on primary mirror