



OPTICAL INTEGRATION AND TEST PLAN

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Two part integration and test



- Subsystem testing: in Madison
 - (6 months + 3 mo contingency)
 - Camera + detector optical testing
 - Doublet null test?
 - Flexure test on tilting bench
 - Burn-in, cycling
- Final Integration in Cape Town
 - (5 month + 1 month contingency)
 - NIR test collimator with doublet
 - End-to-end optical test
 - End-to-end flexure testing
 - Further burn-in cycling



CMM: Brown and Sharp “Global Classic”



Design features

- * 1/2 meter cube measurement area
- * RMS error for this machine measured 0.0025 mm over cube
- * Aluminum ultra-rigid frame and patented Tricision and Slant Bridge design maintain stability.
- * High-resolution Aurodur scales.

Environment

- * Nominal Temperature 20 °C (68 °F)
- * Allowable Temperature Range: 18 - 22 °C (64 - 72 °F)
- * Extended Temperature Range: 16 - 26 °C (60 - 80 °F)

Performance Data

- * Brown & Sharpe tests and evaluates CMM products using the American standard ASME B89 and international standard, ISO 10360-2.



CMM: Brown and Sharp “Global Classic”





Optical testing



- Camera
 - Star test
 - Back Focal Length (BFL)
 - Interferometric
 - All at room temp and at -40C
- Collimator
 - Null test interferometric
- Gratings
 - Throughput
 - Blaze angle
 - Interferometric surface
- Filters
 - Interferometric surface



Star/bfl testing



- Confirm image quality
- Measure rms spot size through focus:
 - hot and cold
 - Match filters to science
 - Broadband and narrow band
 - On axis/off axis,
- field curvature and distortion
- Bfl
- Confirm design and assembly of camera
- Confirm encircled energy
- Vary gravity
- diagnostics

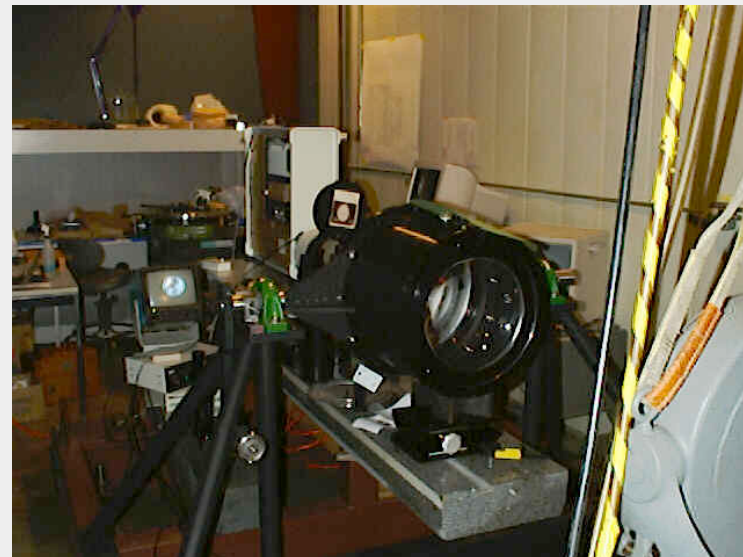
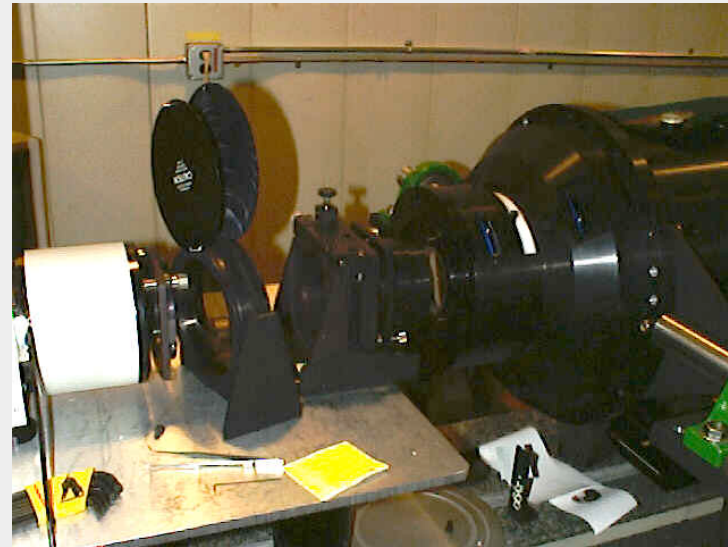




Interferometric



- Measure rms spot size:
 - hot and cold
 - through filters
 - On axis/off axis,
- field curvature
- distortion
- Bfl
- Confirm design and assembly of camera
- Confirm image quality





End-to-end test camera/detector



- Confirm spot size
- Confirm focus
- Confirm focal-plane tilt
- Confirm detector parameters
- Hot and Cold



Burn-in all stages



- Automated testing of stage actuation
- Use hall effect or capacitive sensors to measure insertion errors
- Run all stages at least 1000 times
- Run hot/cold and varying gravity
- Report error statistics after pass.



Madison Subsystem integration



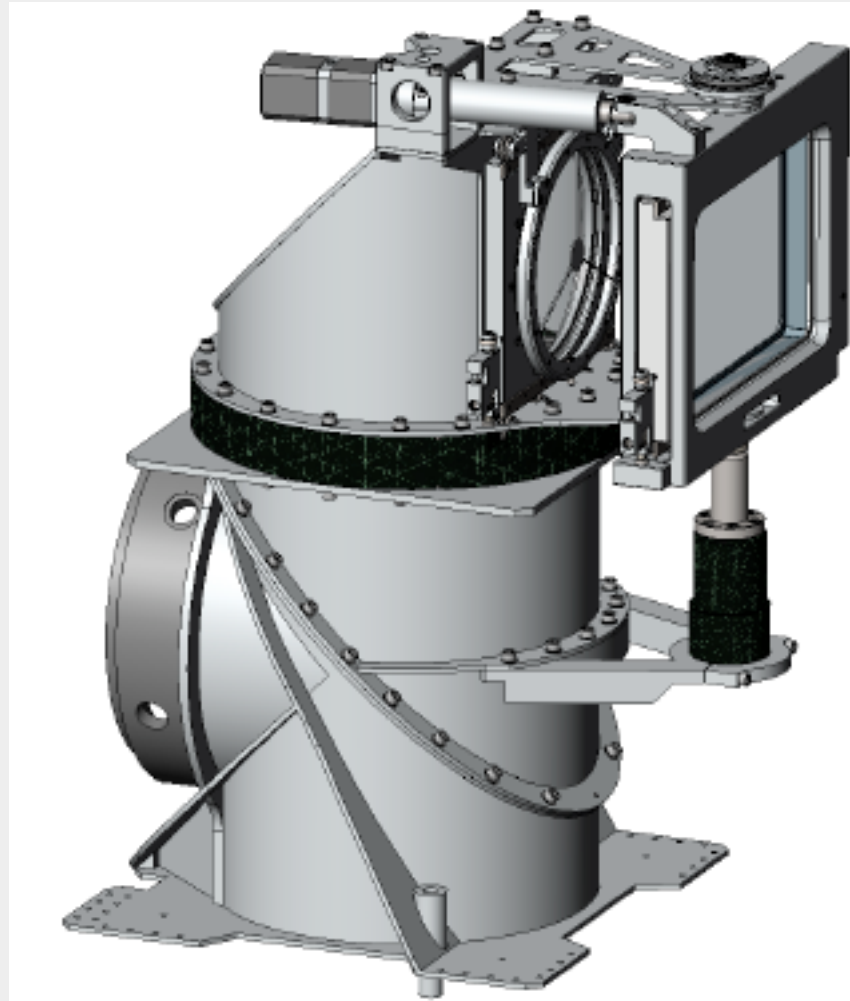
- Build up all subsystems in Madison, confirm assembly final dimensions
 - CMM and /or traditional runout
- Optical testing of components
- Build up OSA and populate and test
- Install into pre-Dewar and test
- Flexure test on tilting bench
 - Warm and cold
- Burn-in, cycling
 - Warm and cold
 - Varying gravity
- Environmental testing:
 - Several facilities exist for -40C work
 - Can do star test, and interferometry at -40C
 - Burn-in cycling at -40C



Madison Subsystem integration



- Build up tower sub-assembly and flexure test
- Grating flexure
- Mirror and dichroic flexure
- Doublet placement and flexure

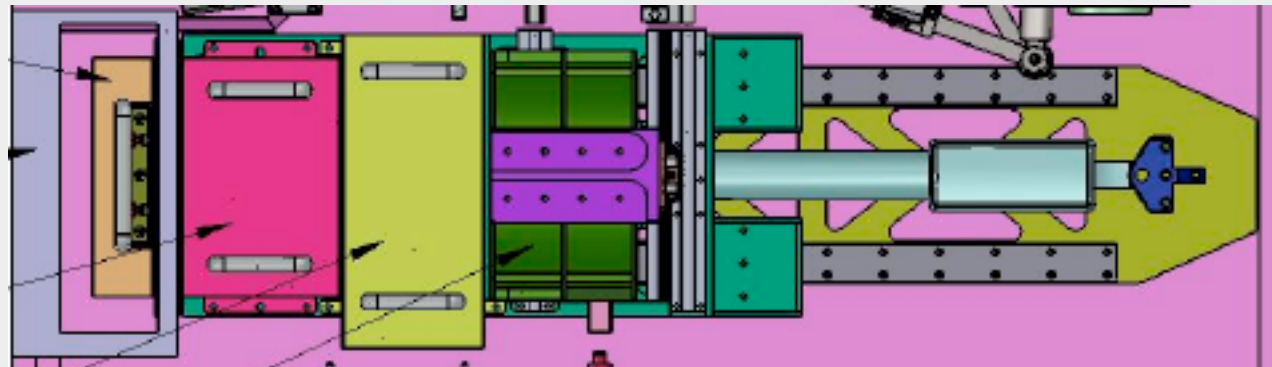
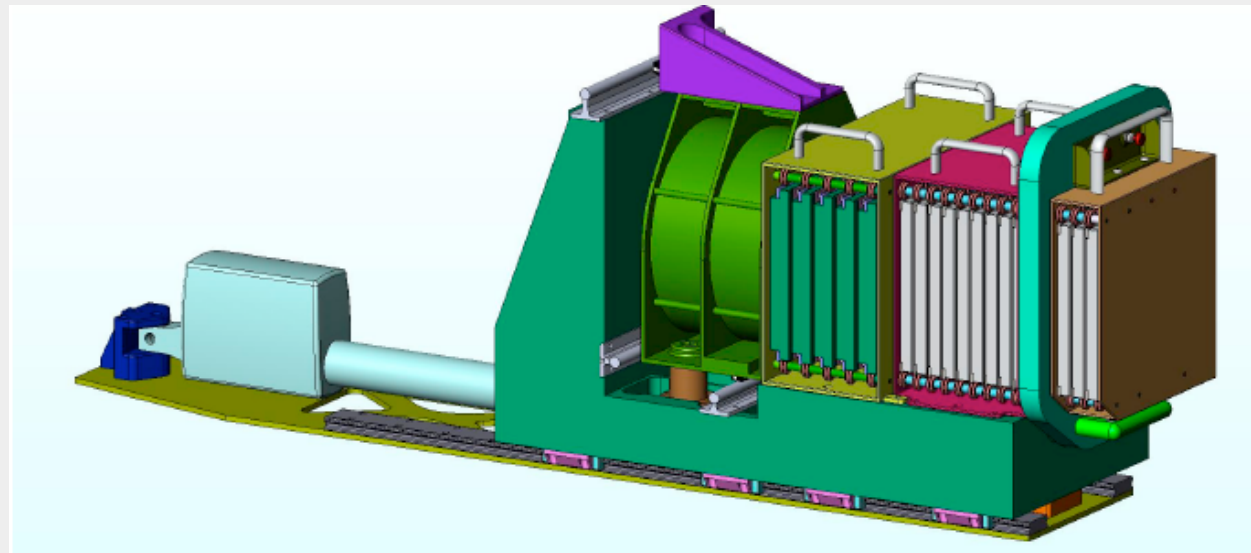




Madison Subsystem integration



- Build up OSA and flexure test
- Automated insertion repeatability test
- Rate and speed test
- Initial alignment test

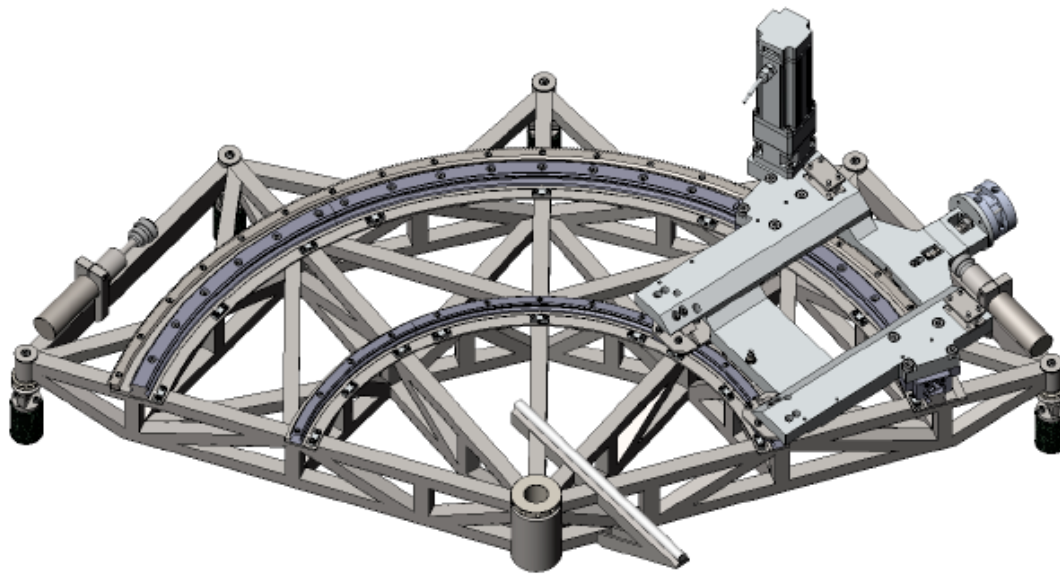
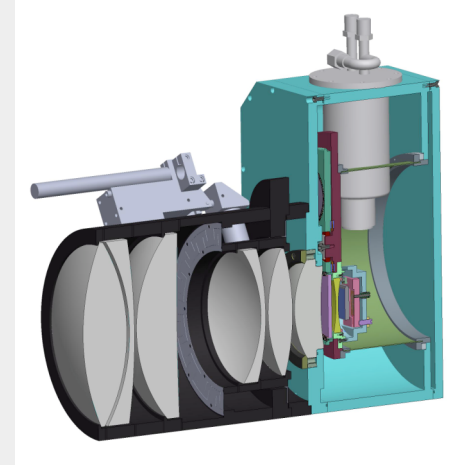




Madison Subsystem integration



- Populate articulation support structure
- End-to-end flexure testing on cradle
- Articulation repeatability and placement
- Speed and operation time





UW Madison facility



- 800 sf class 1000-30,000 clean room
- 2 optical benches (one to be modified for flexure testing)
- Phase-measuring interferometer
- Machine shop
- Optical alignment tooling, autocollimator, alignment telescope, quad cell detectors, microscope, etc



PSL Facility



- PSL large environmental chamber
- Capable of cooling to -40C
- Smaller facilities in SSEC
- Set up tests and man them in cold environment





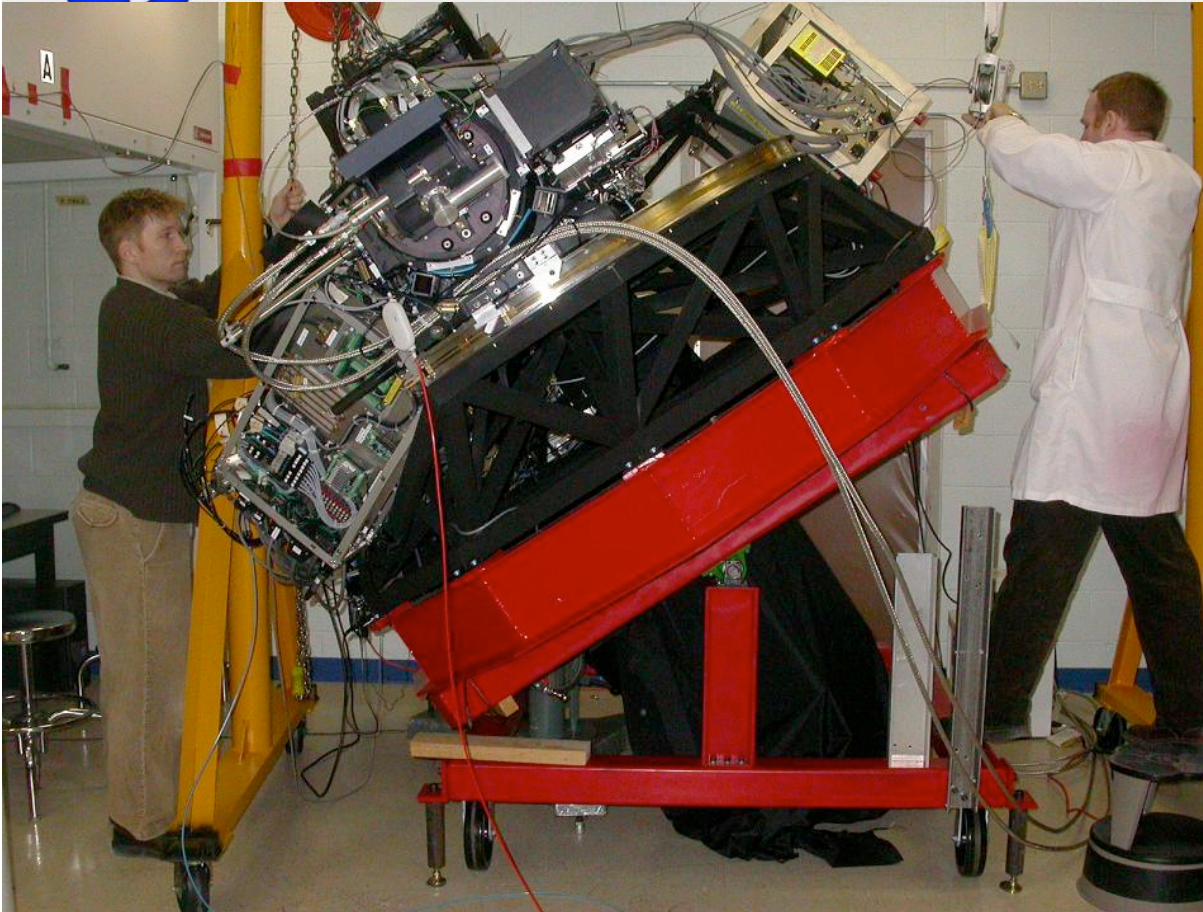
Cape Town System Integration



- At Cape Town
- Instrument will be down for 16 weeks minimum
- Bring everything we need there
- Modify integration platform for full 2-axis flexure testing
- End-to-end optical testing



Flexure testing



- Modify carriage for 2-axis



Flexure Testing





End of Integration