UPGRADES IN THE LABORATORY

Judit Sturmann

LIST OF UPGRADES

- CCD based tip/tilt for all 6 beams
- New beam reducing telescopes
- Small retros for each line
- Modified 2-beam path to NIRO
- Modified rail alignment and clamping method
- Reference camera with adjustable focus

UPGRADES IN PROGRESS

- New fused silica splitter cube
- Remote POP and baseline change
- New focusing optics to NIRO for 6 beams
- Remotely controlled iris

SOME OTHER NEWS

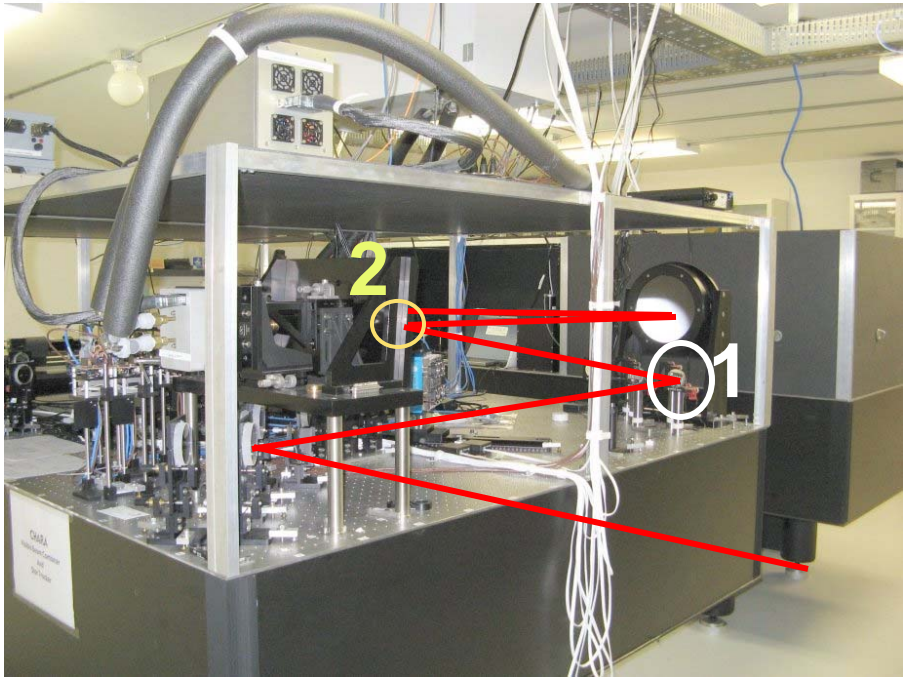
- New diagnostic tools and procedures
- Mysterious spikes detected

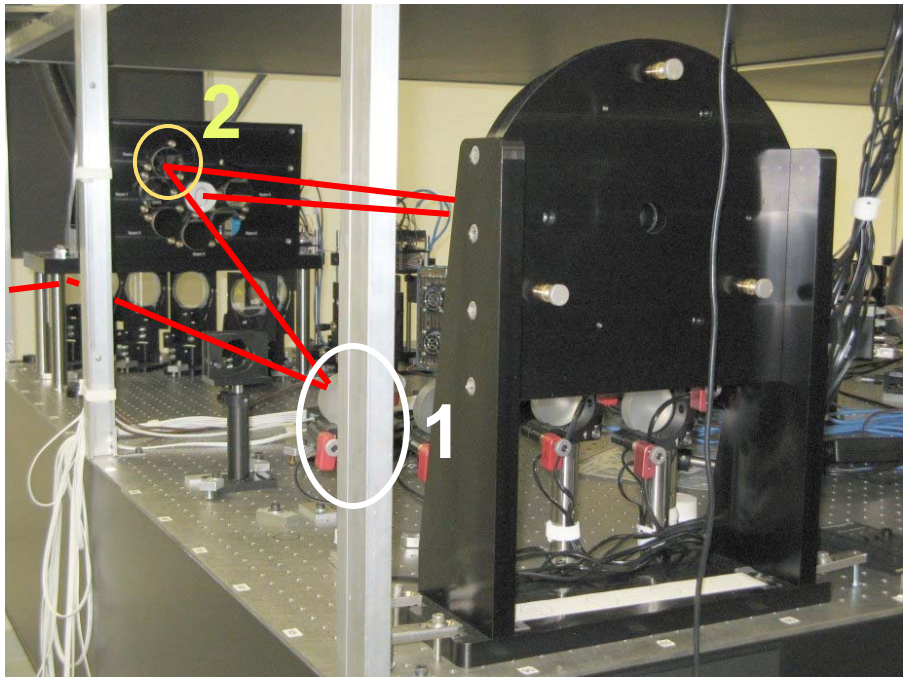
CCD BASED TIP-TILT FOR ALL 6 BEAMS

Design: Laszlo Sturmann
Mount fabrication: Charles Hopper GSU Machine Shop
+ Newport standard parts

Lower limit: 100 ADU / 10-20 ms / quad
Upper limit: 200 000 ADU / exposure / quad

CCD BASED TIP-TILT FOR ALL 6 BEAMS

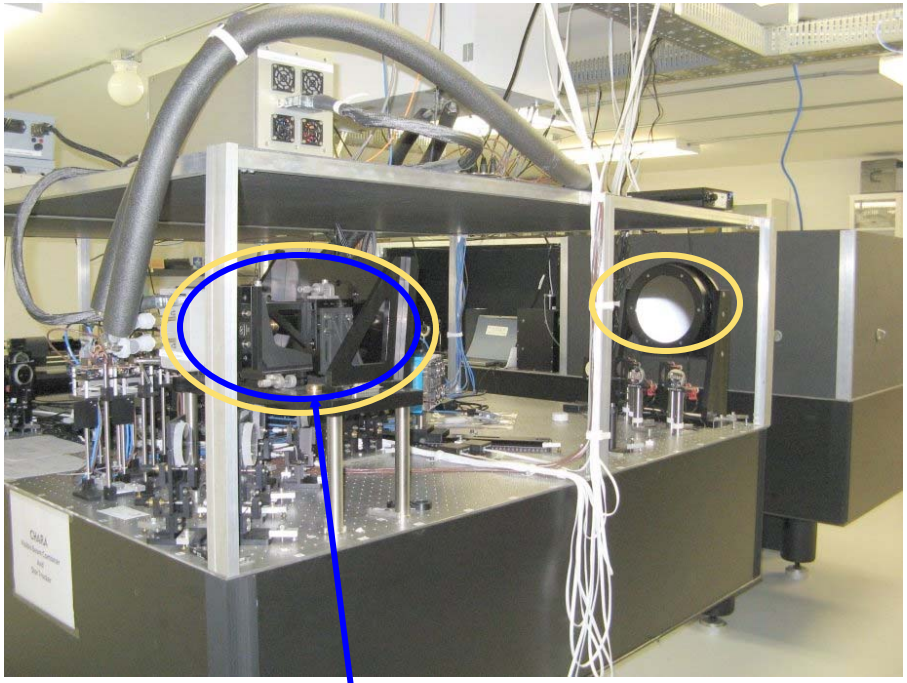


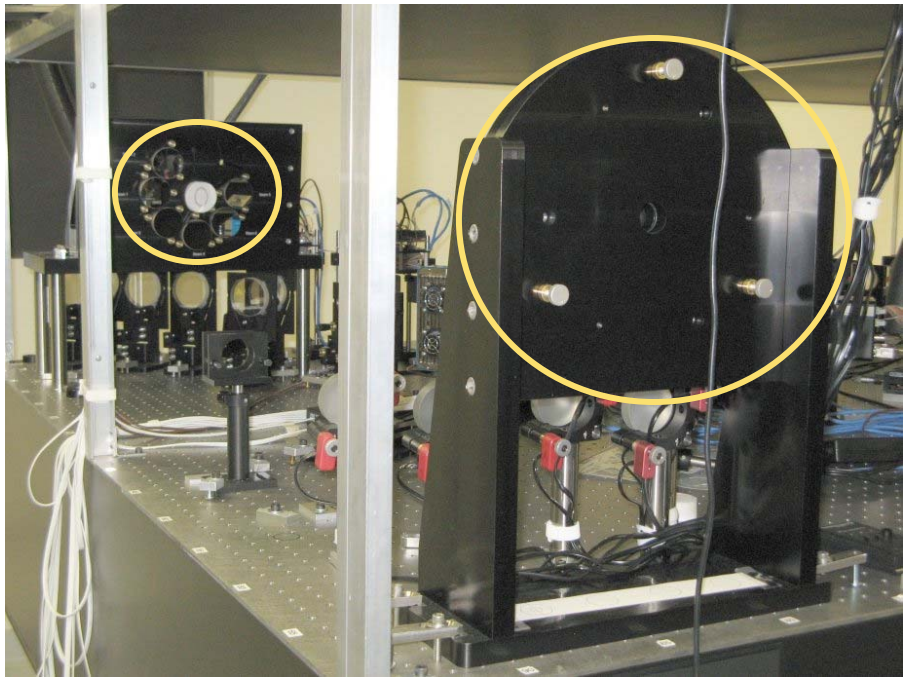


Lower limit: 100 ADU / 10-20 ms / quad
Upper limit: 200 000 ADU / exposure / quad

Each beam is individually controlled by the first two fold mirrors
The first fold mirrors are remotely controlled, this does not mean they have to be moved around

CCD BASED TIP-TILT FOR ALL 6 BEAMS





Lower limit: 100 ADU / 10-20 ms / quad
Upper limit: 200 000 ADU / exposure / quad

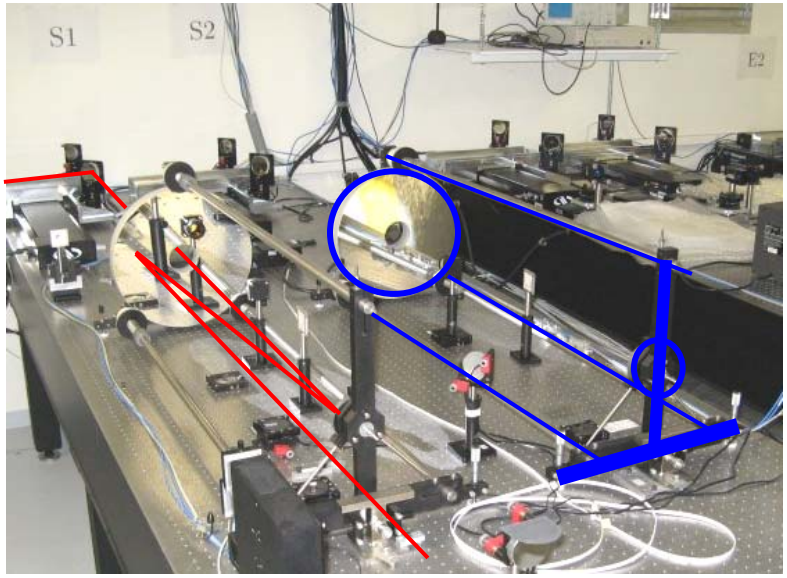
Focusing and relay optics

NO ADJUSTMENT NECESSARY BY USERS

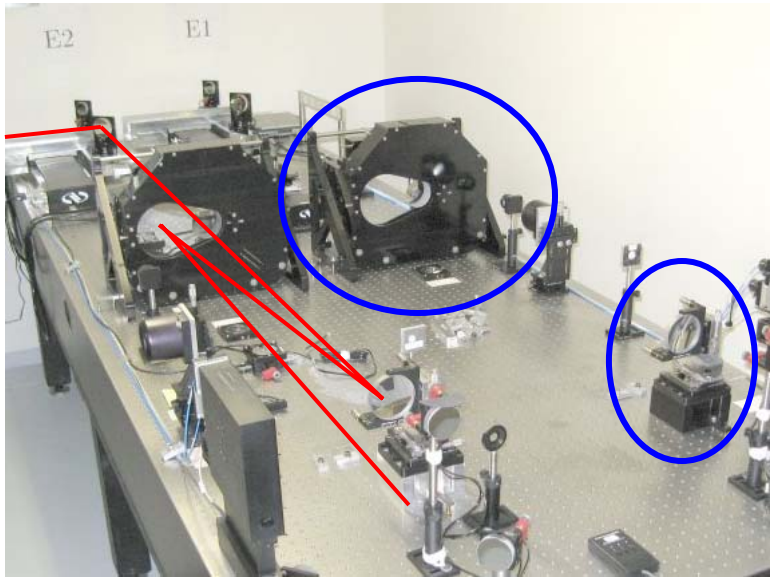
BEAM REDUCING TELESCOPES OLD AND NEW

Design: Laszlo Sturmann
Mount fabrication: Charles Hopper
GSU Machine Shop
+ Newport standard parts

BEAM REDUCING TELESCOPES OLD AND NEW



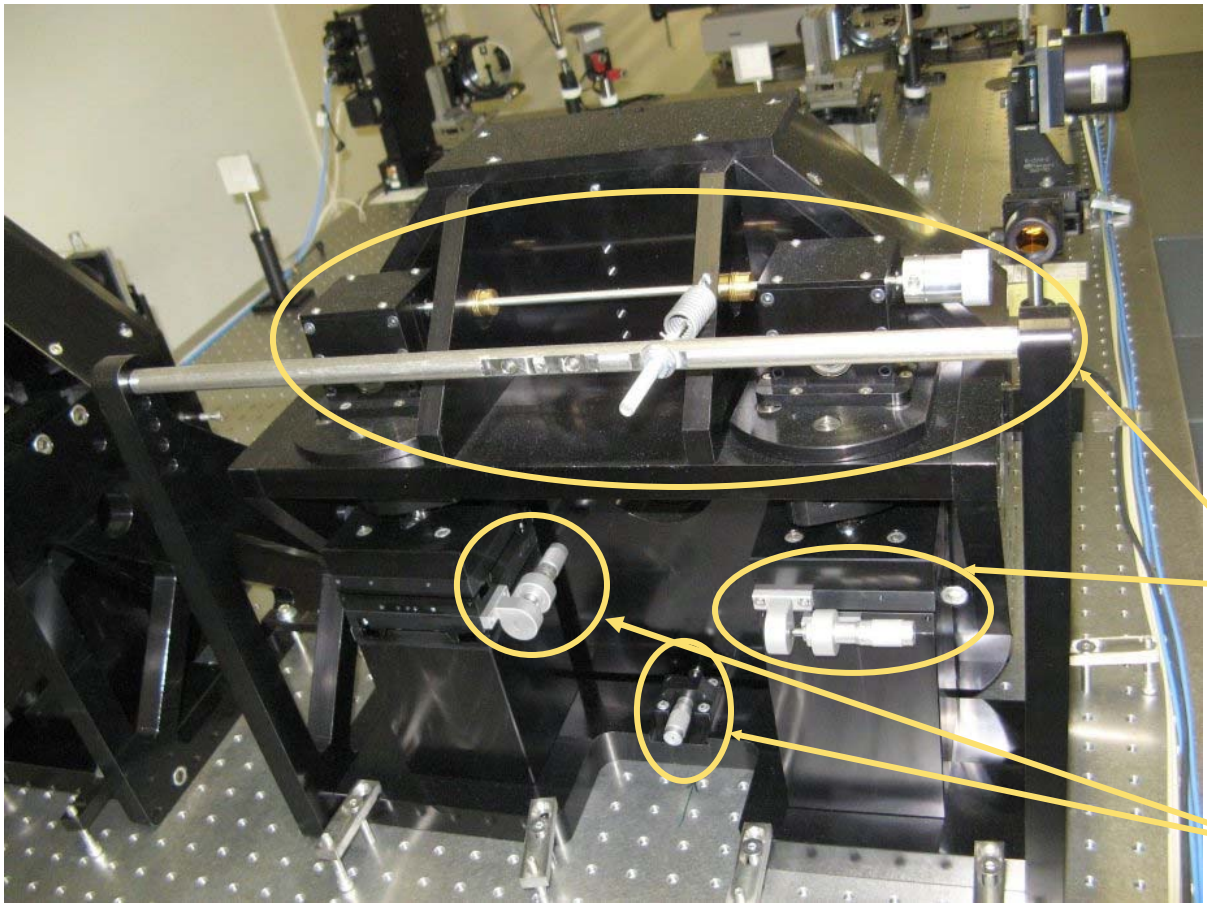
Support: weak, unstable
Adjustments: some crude
far from orthogonal



Support: robust, stable
Adjustments: fine, easy
mostly orthogonal

The stability of the new mounts enables remote baseline and pop change.
(Remote baseline change is not yet fully tested.)

BEAM REDUCING TELESCOPES
NEW PRIMARY



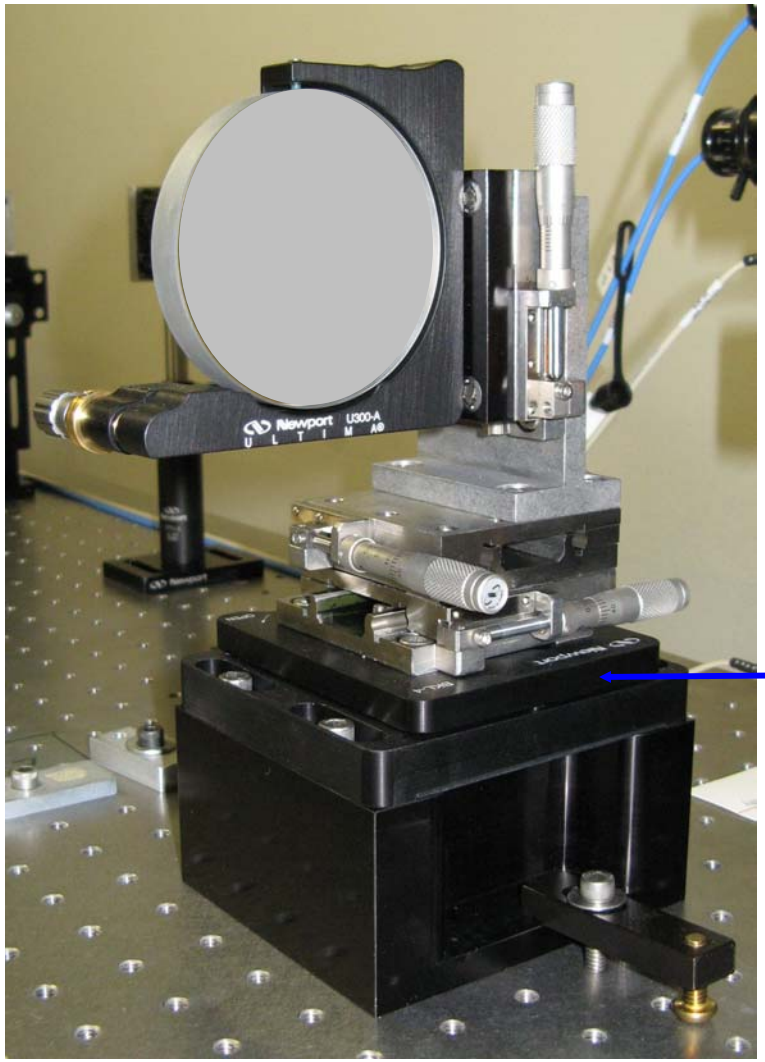
Four degrees
of freedom
fine adjustment

NO ADJUSTMENT
NECESSARY
BY USERS

Two translations

Two tilts

BEAM REDUCING TELESCOPES NEW SECONDARY



Five degrees of freedom fine adjustment

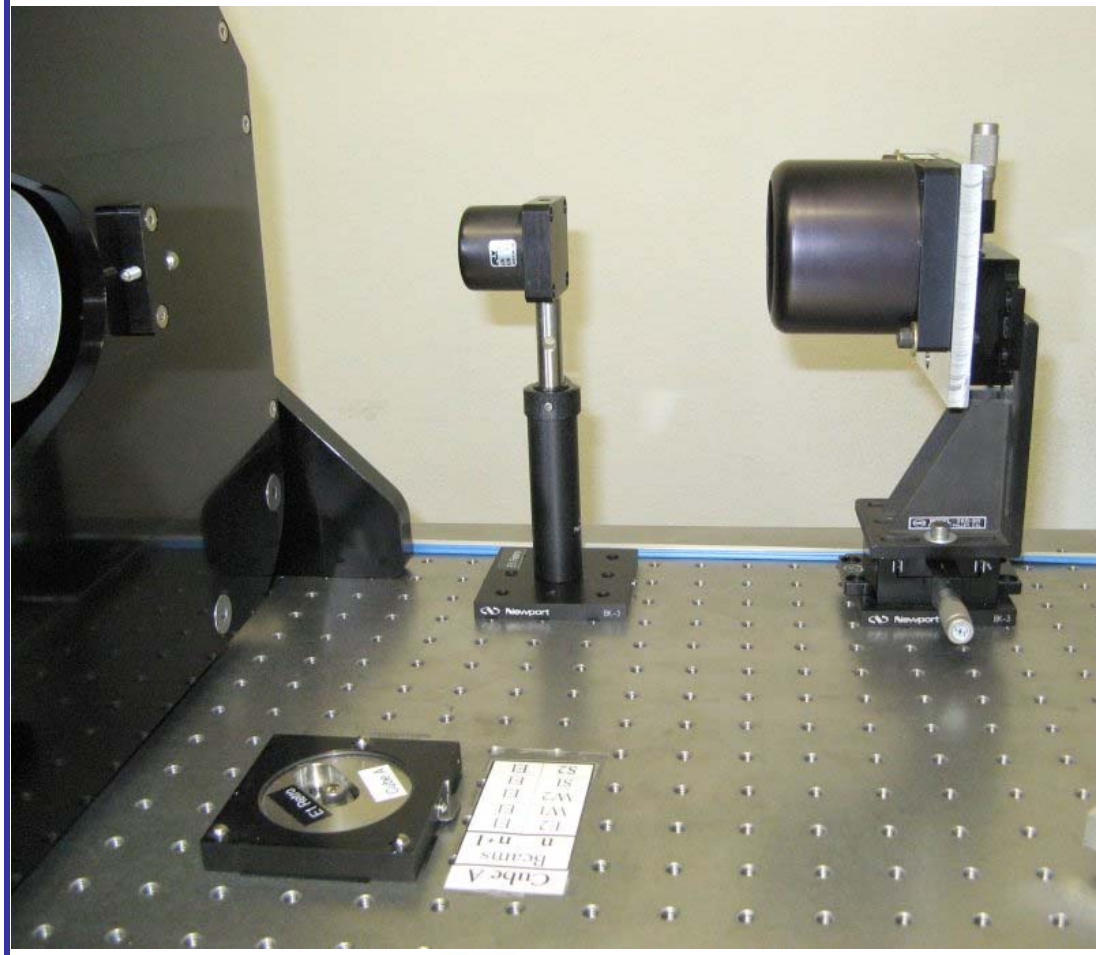
NO ADJUSTMENT NECESSARY BY USERS

Kinematic base

to facilitate rail alignment without alignment laser going through the BRT

SMALL RETROS FOR EACH LINE

Forget the two-hole jig (if you can), we have 6 labeled retros to place them quickly on their labeled bases.

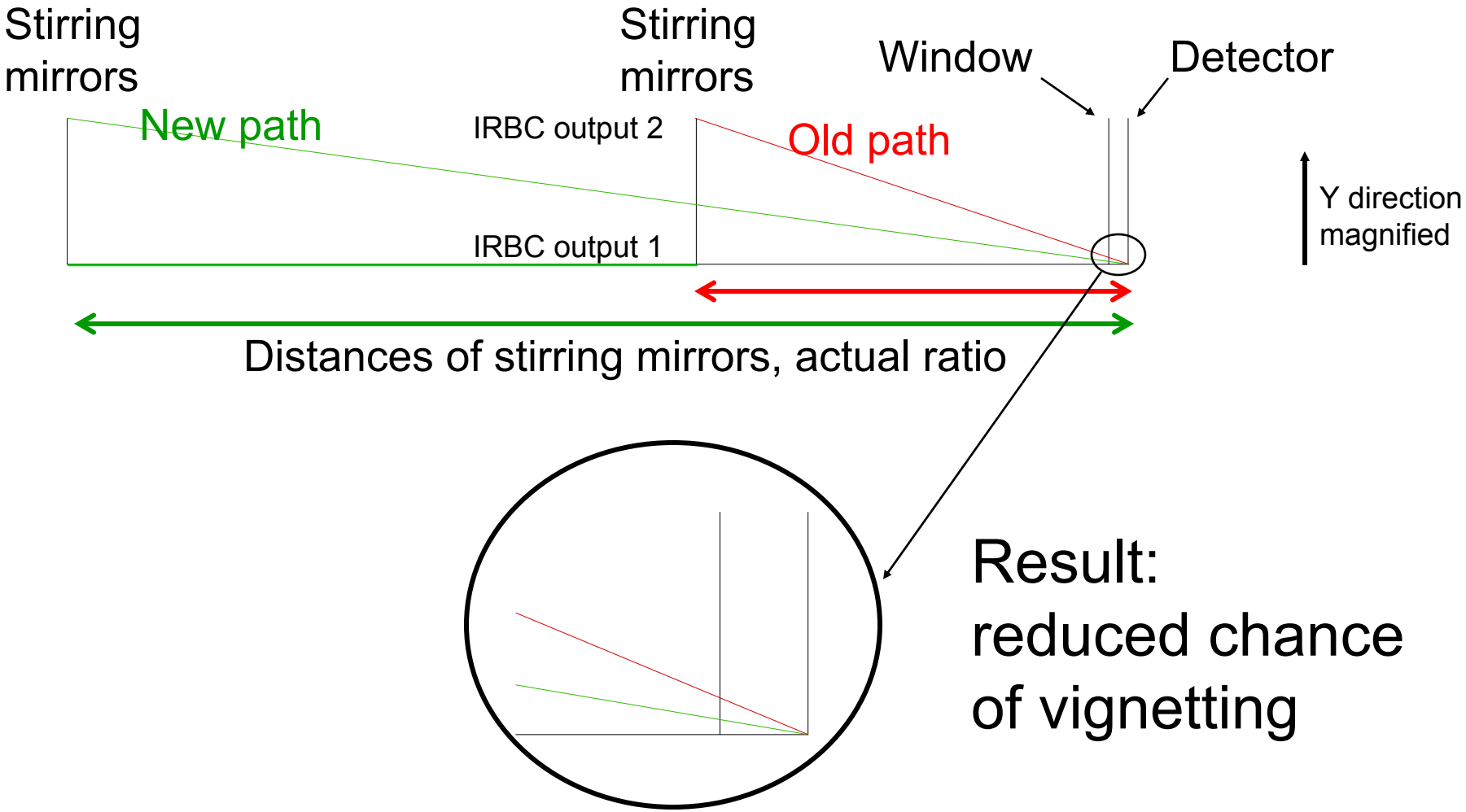


The purpose is to create **repeatable return beams** for aligning all beam combiners and Tip/tilt.

The paths are not equalized
For VIS or IR fringes the use of big retros and fold mirror is necessary.

For laser fringes on Classic the small retro is working in place of “Cube A”, but you have to use the fold mirror, if using such a baseline.

MODIFIED 2-BEAM PATH TO NIRO



Result:
reduced chance of vignetting

MODIFIED RAIL ALIGNMENT AND CLAMPING METHOD

The alignment method is essentially the same using the alignment laser as in TR #92 by Chad Ogden.

Rail alignment gone bad in a few months. A lot of stress built up in the rails. → Important modifications to TR #92:

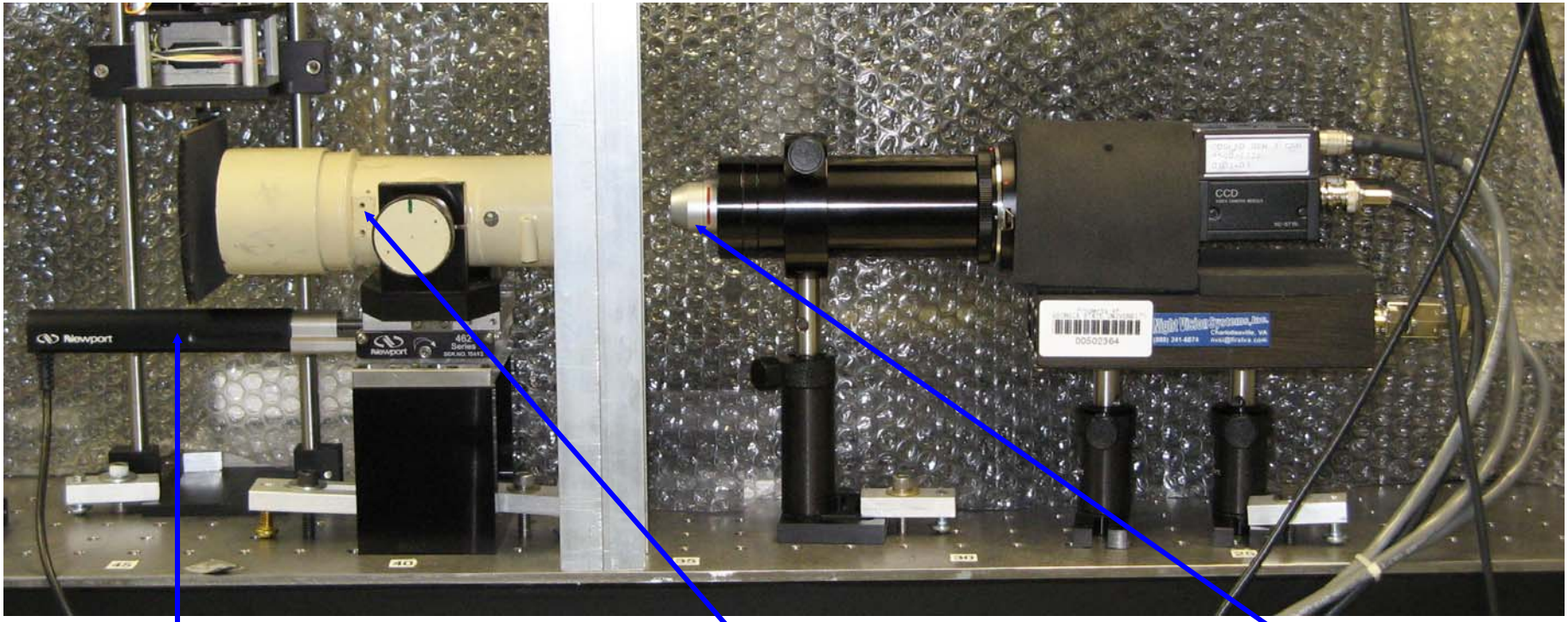
- When aligning the guide rail all clamps on all three rails should be completely loose.
- Do at least two passes on the guide rail, preferably a day apart.
- To increase precision, only one person should be in the BC – OPLE area to minimize lab seeing while aligning the guide rail.

- It is enough to clamp the rails at every third sleeper.

E1 and E2 were done accordingly,
they held alignment so far, after nearly a year.

REFERENCE CAMERA WITH ADJUSTABLE FOCUS

Focusing from IR table target to infinity greatly extends possible usage



Encoded motor
on a translation stage
BC2 axis2

Theodolite objective
[eyepiece removed
from the mount]

Microscope objective
and adapter tube

SOON: REMOTE POP AND BASELINE CHANGE

Remote POP change is now possible using the focusable Reference Camera.

To make it user friendly
- List of positions for the encoded motor
- User-friendly gui
- Procedure → job queue

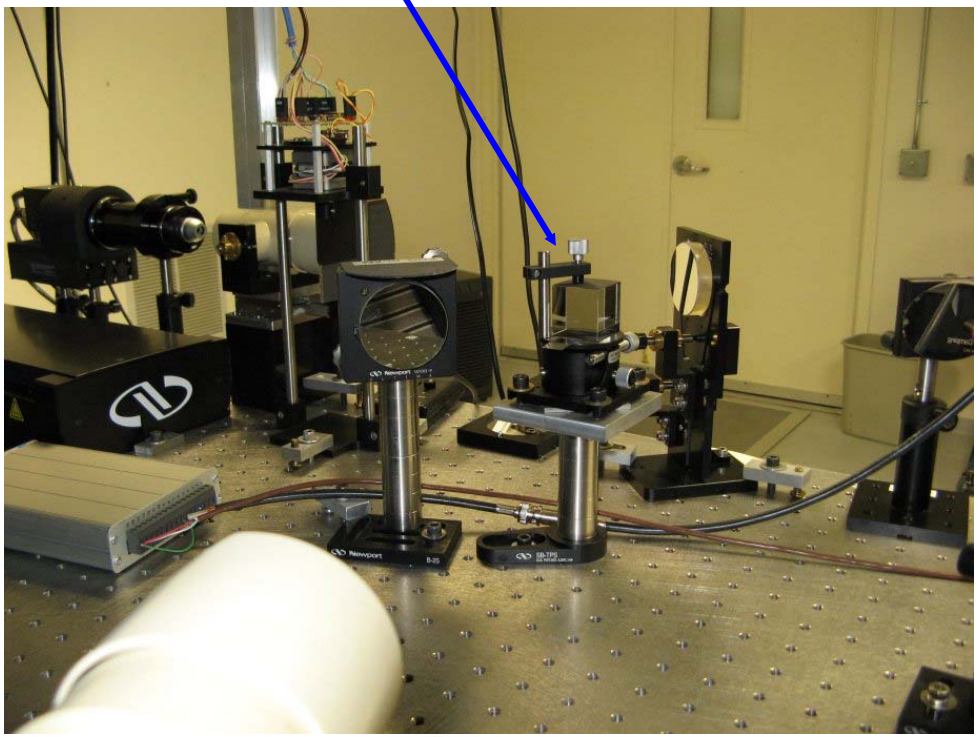
Remote baseline change will most likely rely on the focusable Reference Camera.

To do
- Experimenting with possible check targets
- Installing check targets
- Procedure → job queue

SOON: NEW FUSED SILICA BEAM SPLITTER CUBE

The new cube with broadband AR coating is in hand.

This BK7 splitter cube will be replaced
to have more IR flux available from the internal source
to minimize unwanted backside reflections



The final alignment of the Reference Camera can be done after the new splitter cube is in place.

OTHER UPGRADES IN PROGRESS

- New focusing optics to NIRO for 6 beams
  A requirement for the planned classic 3-way combiners.

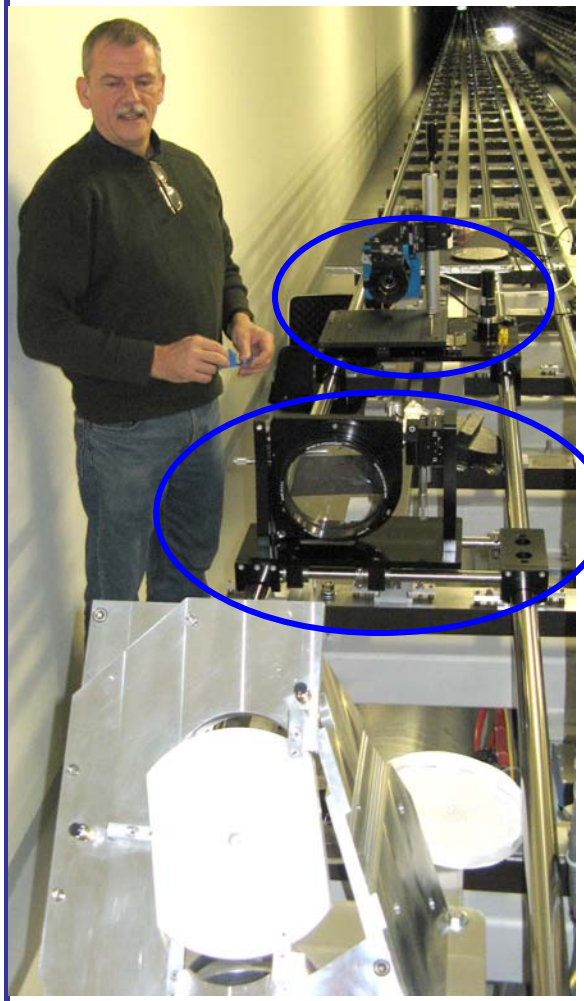
  Feasibility study done by Art Vaughan:
  It can be done without using fibers.
  The dewar will be modified inside.

- Remotely controlled iris

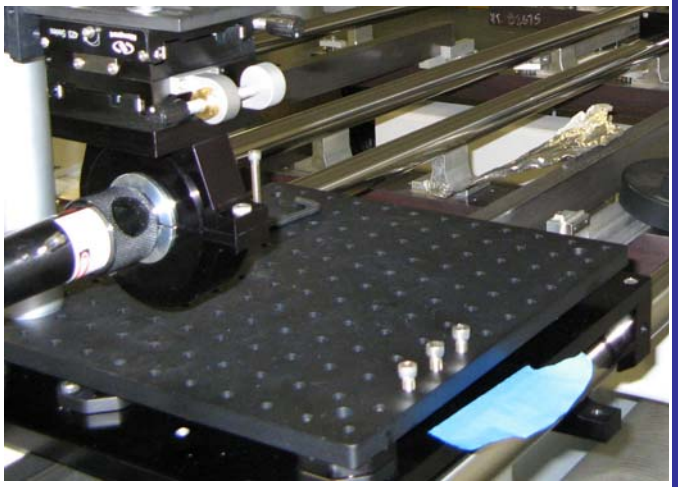
  The concept of the second version exists.

NEW DIAGNOSTIC TOOLS AND PROCEDURES

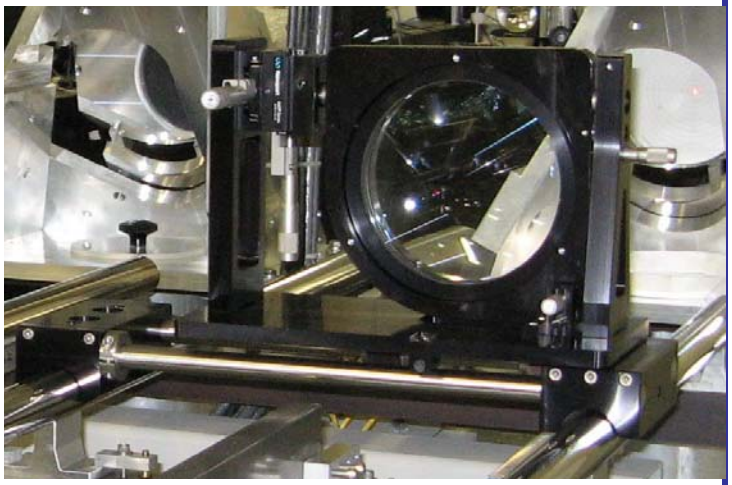
The Rail Scope It can be easily aligned on either side of the rail looking either directions



Optical table at the focus
Top part has kinematic points for both beam positions



6” Meade apochromat on a pair of cross rails + fine adjustments



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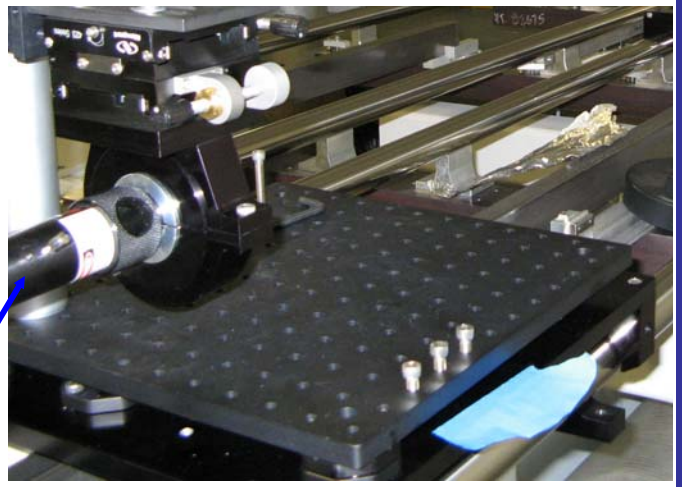
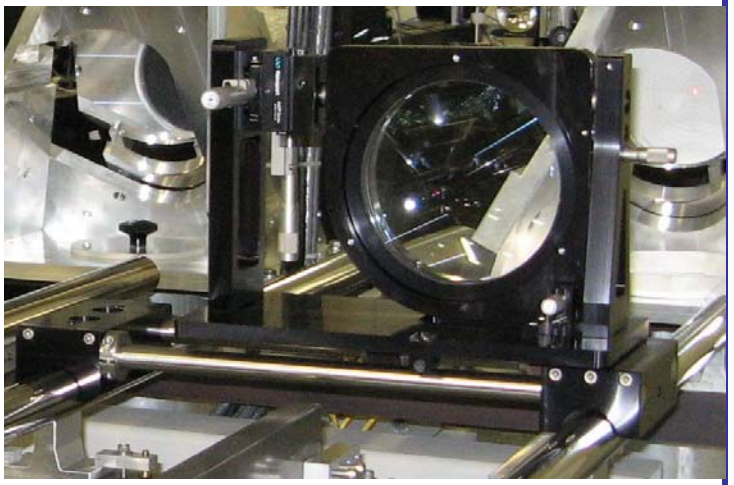
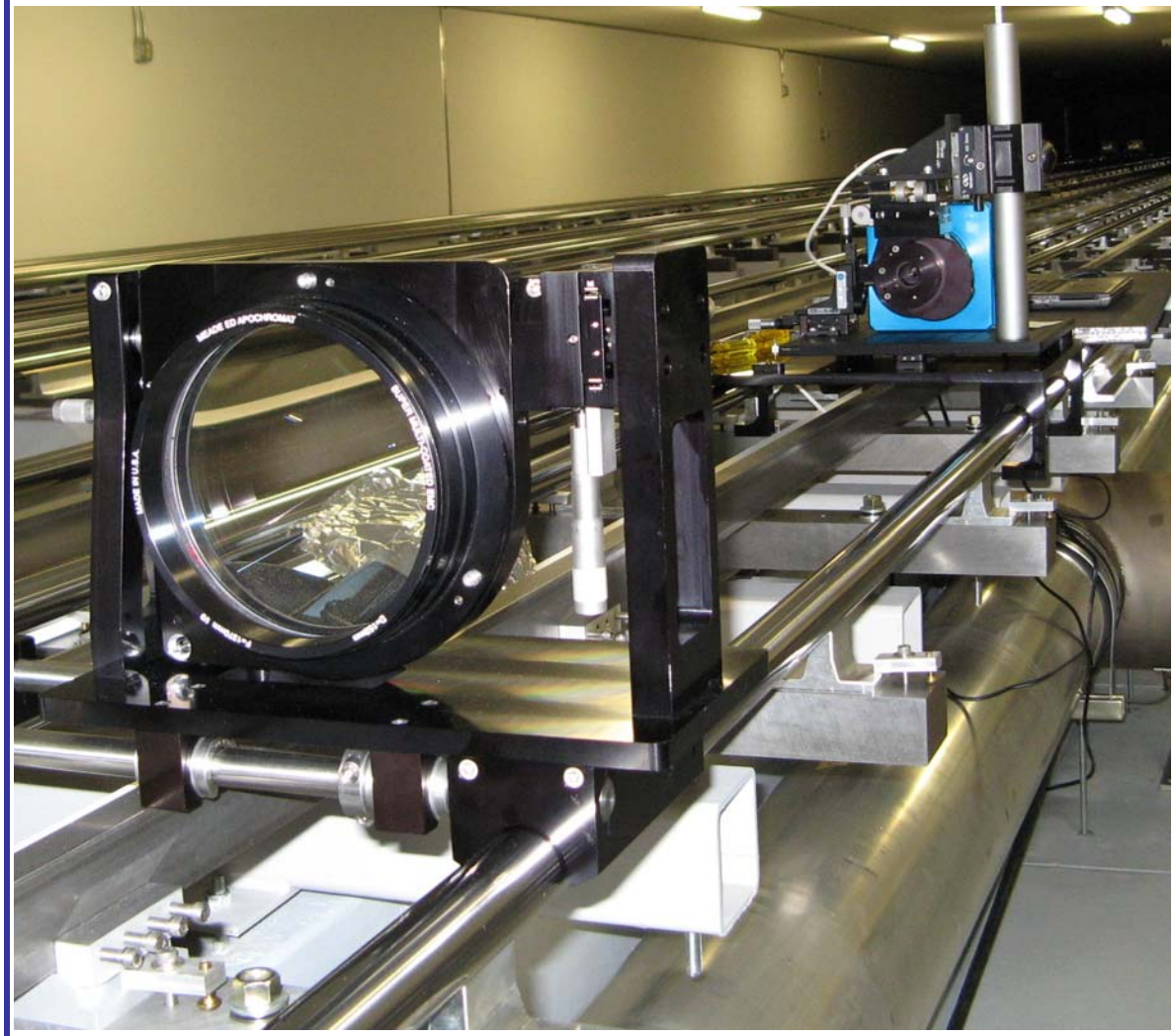


Telescope alignment laser for proper position and tilt of the objective



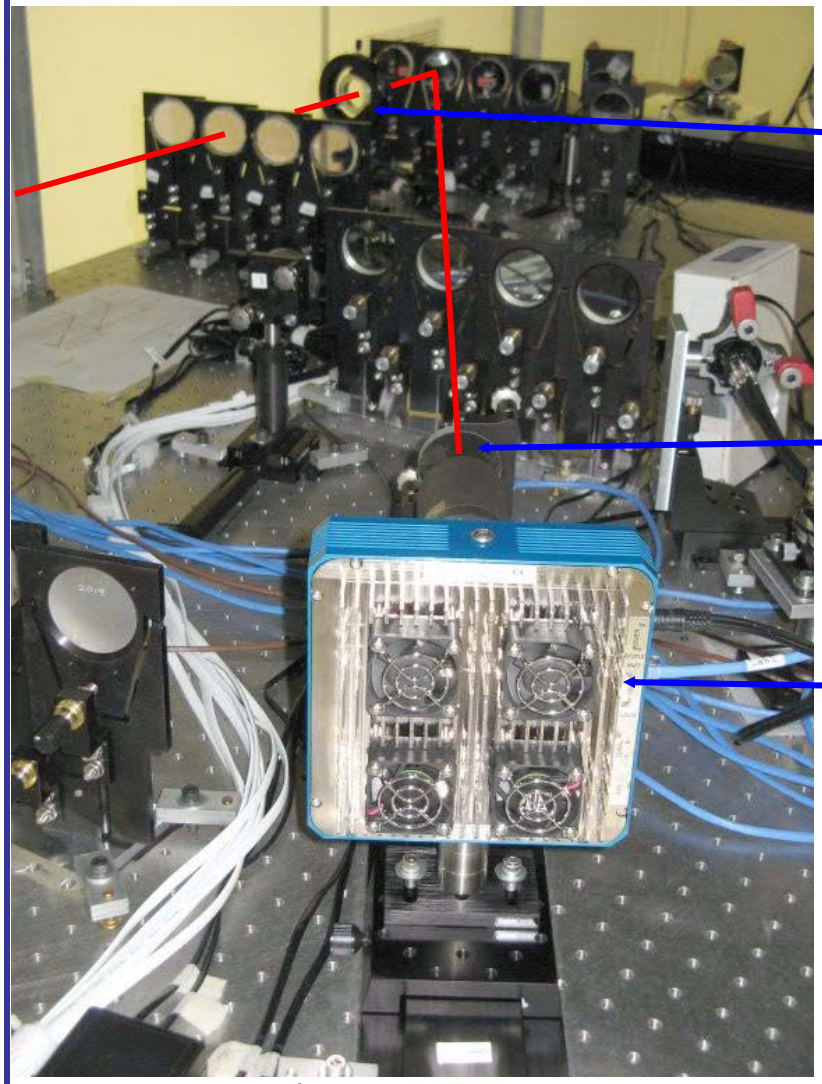
NEW DIAGNOSTIC TOOLS AND PROCEDURES



Uses of the rail scope

- Visual inspection through an eyepiece
- Photography using any camera
- Hartmann tests (masks exist) to perfect
  cart, BRT,
  white light source
- Curvature sensing to verify proper alignment

NEW DIAGNOSTIC TOOLS AND PROCEDURES



VIS Transmittance experiment

Mount for the filters

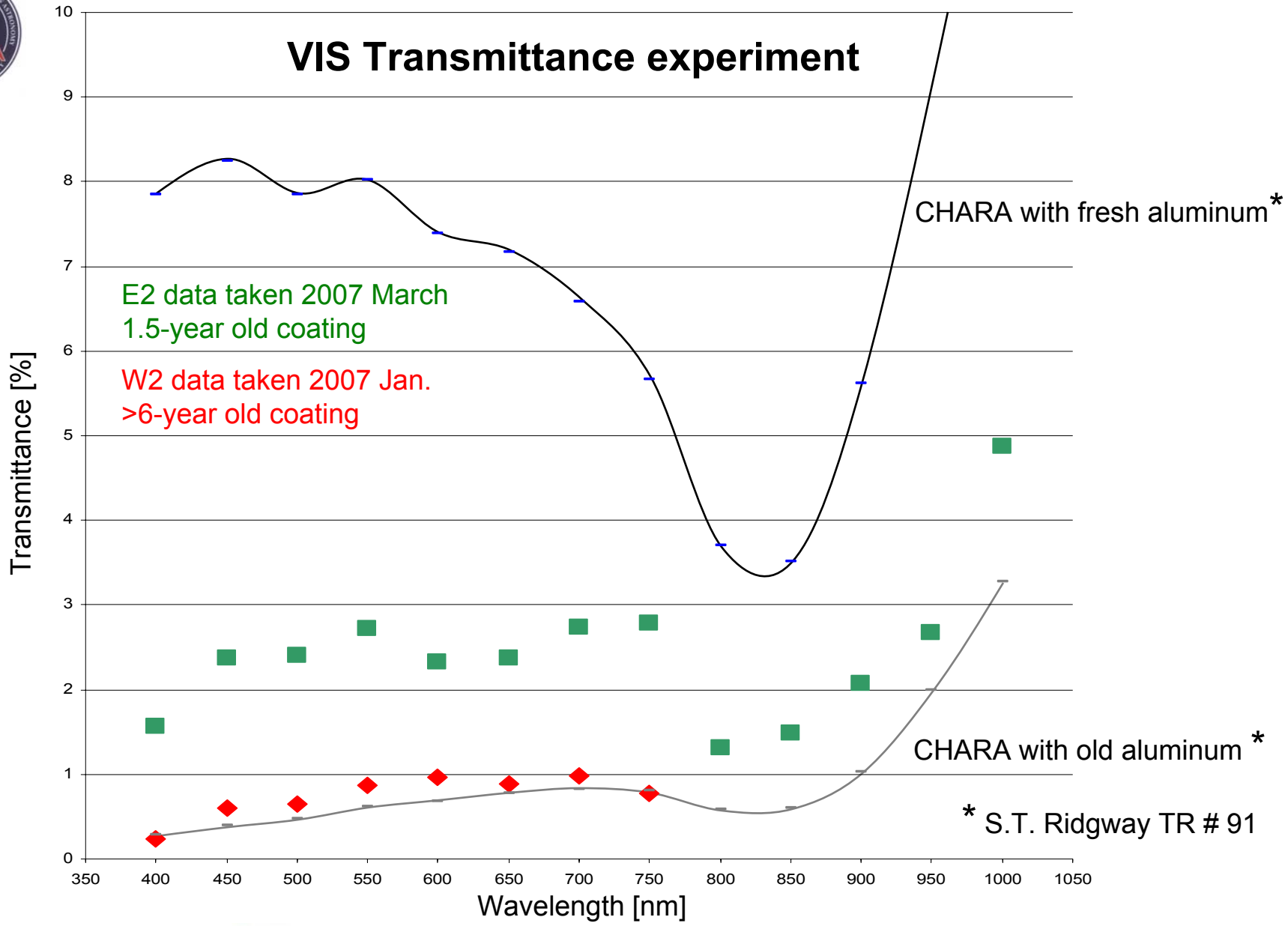
Andover BW =10 nm

400nm ≤ CWL ≤ 1000nm

50 nm increments

Newport achromat

Apogee CCD camera


VIS Transmittance experiment
Transmittance [%]
Wavelength [nm]
0
1
2
3
4
5
6
7
8
9
10
350
400
450
500
550
600
650
700
750
800
850
900
950
1000
1050
E2 data taken 2007 March
1.5-year old coating
W2 data taken 2007 Jan.
>6-year old coating
CHARA with fresh aluminum*
CHARA with old aluminum *
* S.T. Ridgway TR # 91

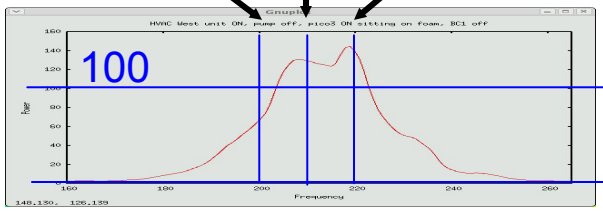
First Contact

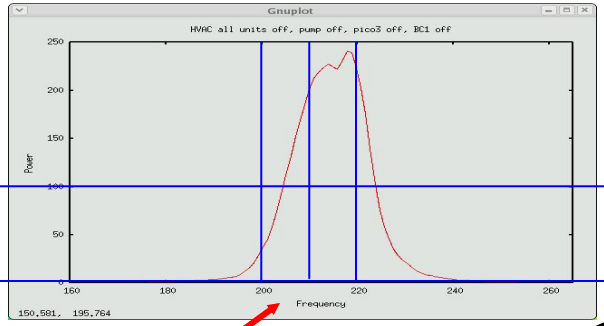
Peeled off from W2 primary after ~15 hours drying time.

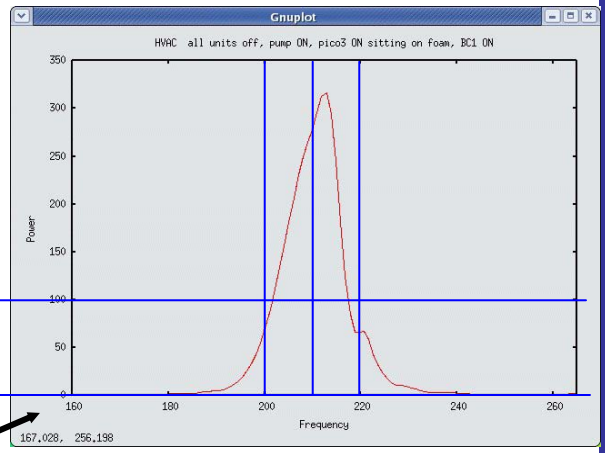
MYSTERIOUS VIBRATIONS DETECTED

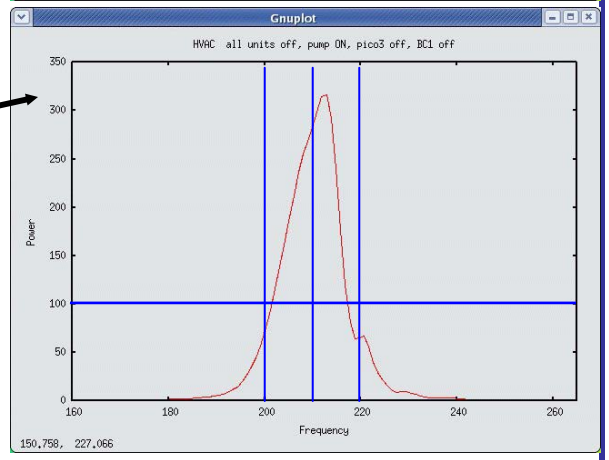
Lab fringes in K band

200 Hz 210 Hz 220 Hz









HVAC	west ON	all OFF	all OFF	all OFF
Pump	OFF	OFF	ON	ON
Pico3	ON	OFF	ON	OFF
		?		

This was observed with stars too.

See for ex: Deepak Raghavan
2007-03-09 UT Observing Report

THE END