CHARA Michigan Phase-tracker

fringe tracking in the near-infrared

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CHARA Collaboration Meeting
Mar 2007, New York City, NY

New Michigan CHAMPions

Matt Anderson

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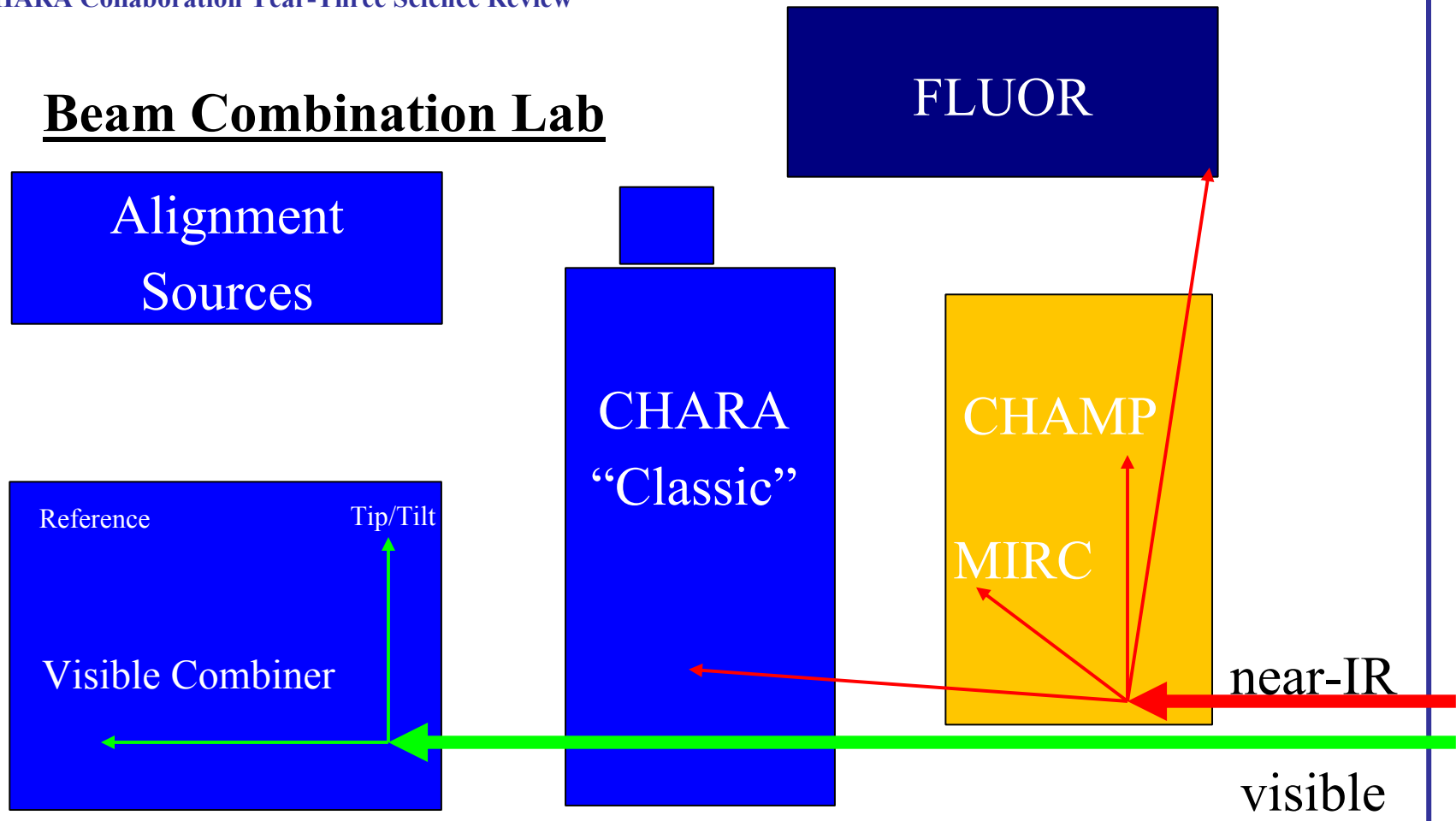
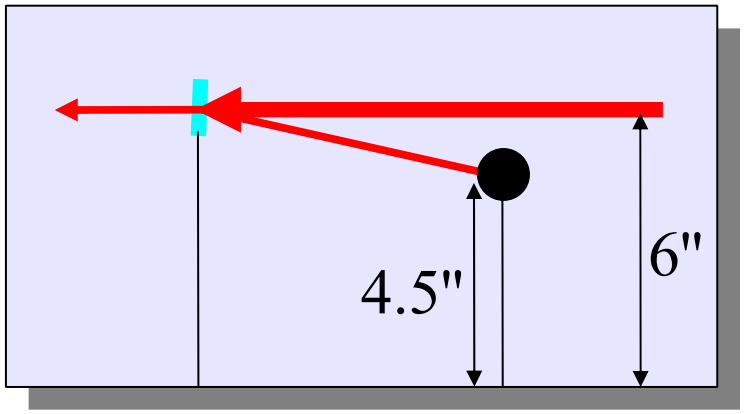
Overview

- removes atmospheric and mechanically induced phase changes (“freezes the fringes”)
- longer coherence and integration times
- increased sensitivity
  - for MIRC, ~3-4 magnitudes
  - shorter path length modulation
- separate fringe tracker from science combiner

Beam Combination Lab



CHAMP gets 50% JHK, JH, or K



dewar
filters
cold stops
reimaging optics
detector

beam reduction & packaging

12 outputs: 1+2, 2+3....6+1

Beam Combiners

to science instrument

FT beam splitters

Path Mod

Phased Beams

Beam Splitters

Post Combination Beam Transport

Requirements

- Twelve 1” beams from 6 beam splitters must be split into 4 sets of 3 beams, each set to be focused on different quadrants
- Minimize thermal background for sensitive K band detection

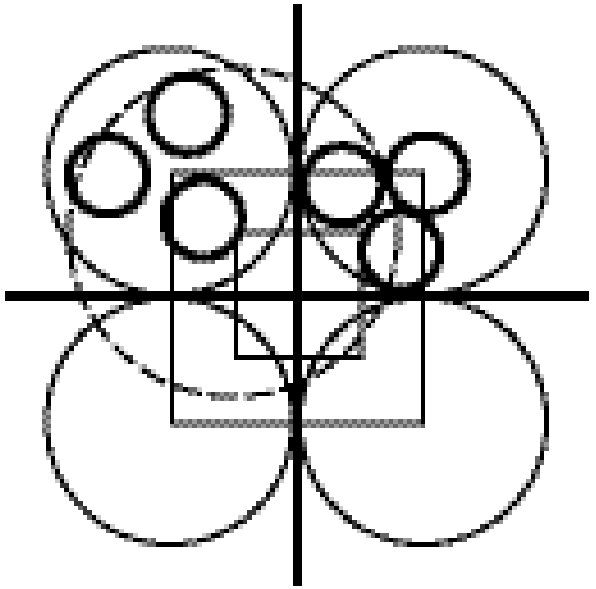
Free Space Transport

•higher sensitivity

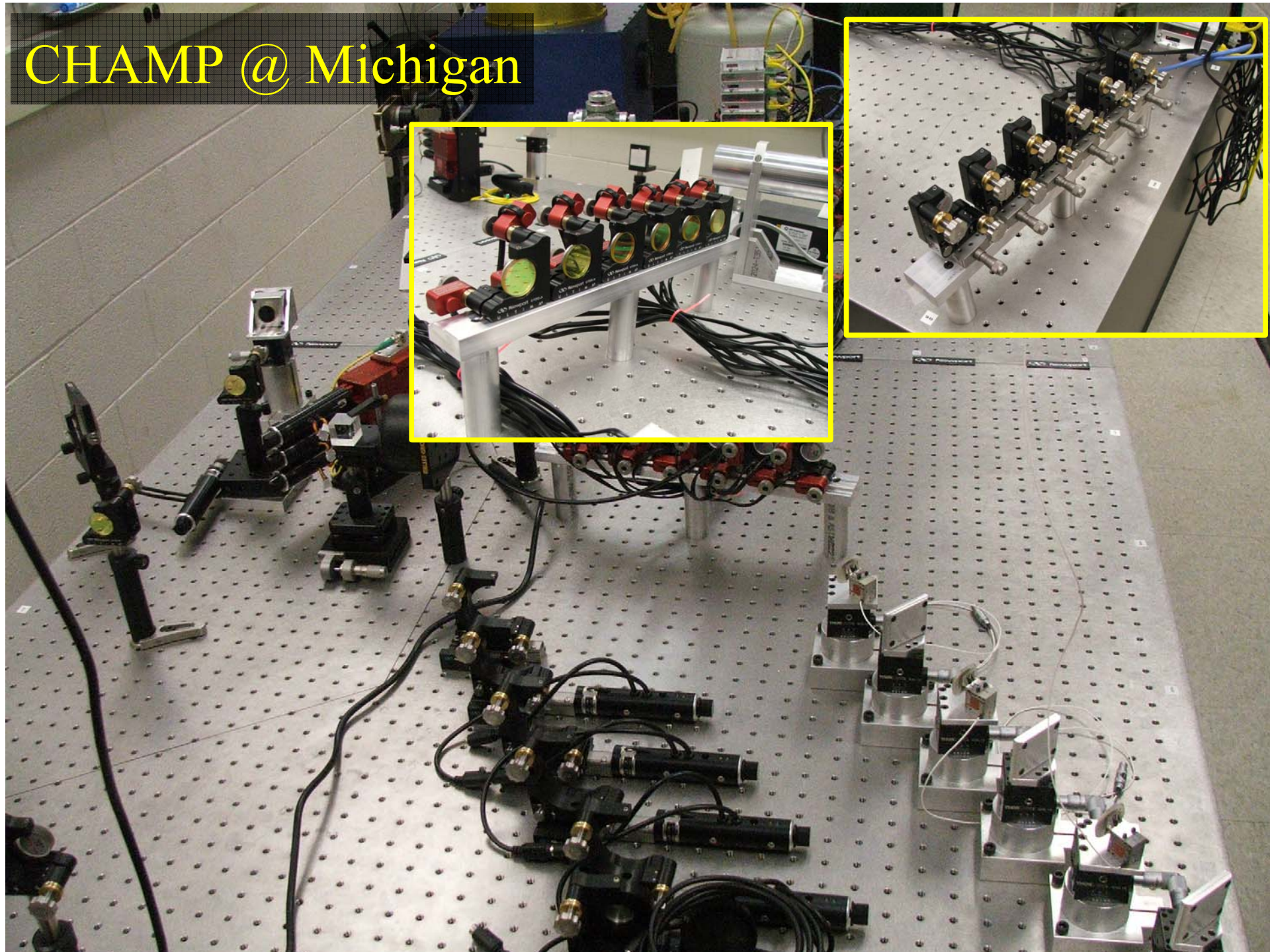
•allows for focus outside dewar: good for alignment AND spatial filtering

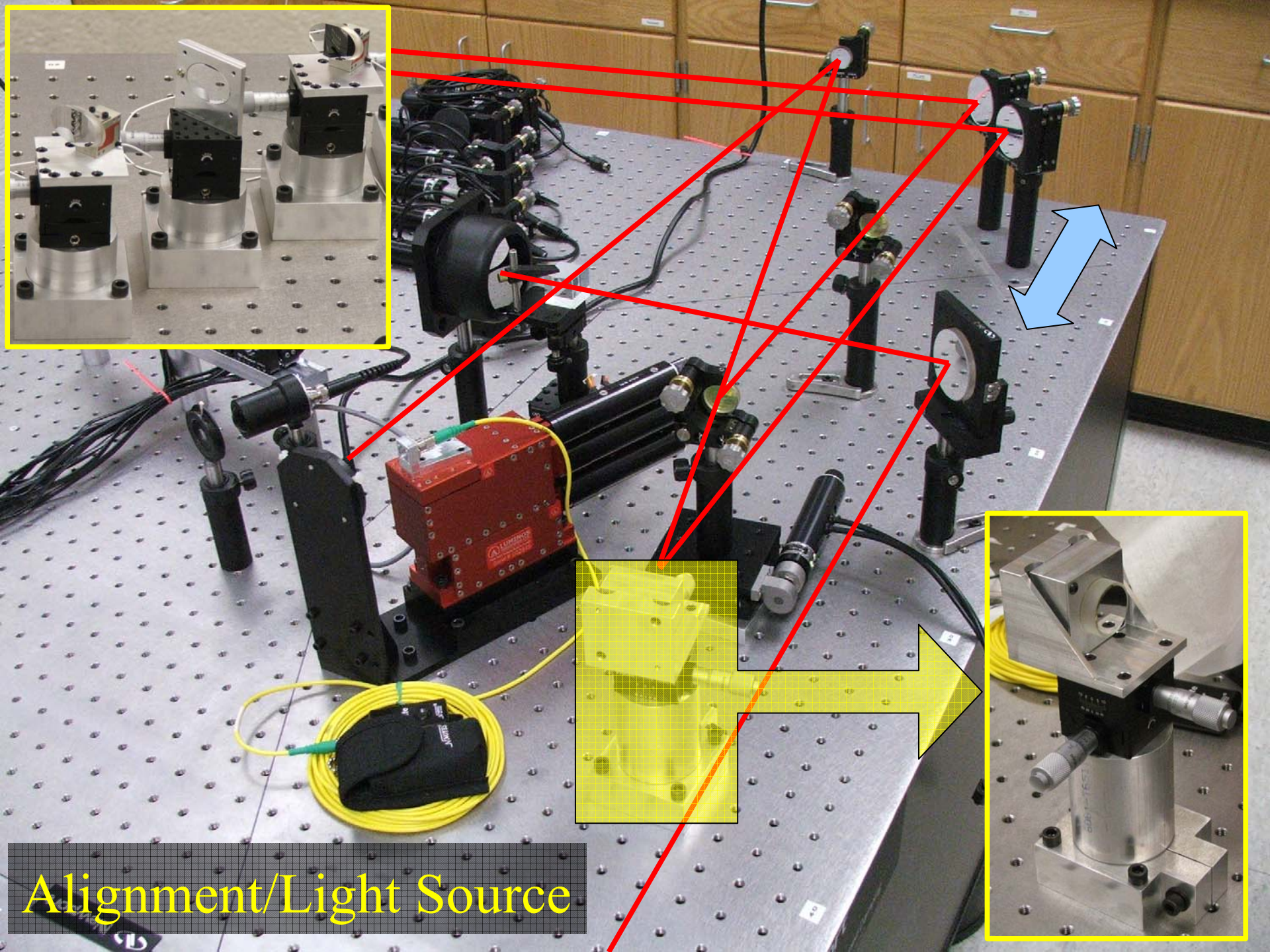
•requires beam compressors

•requires MANY small optics inside dewar

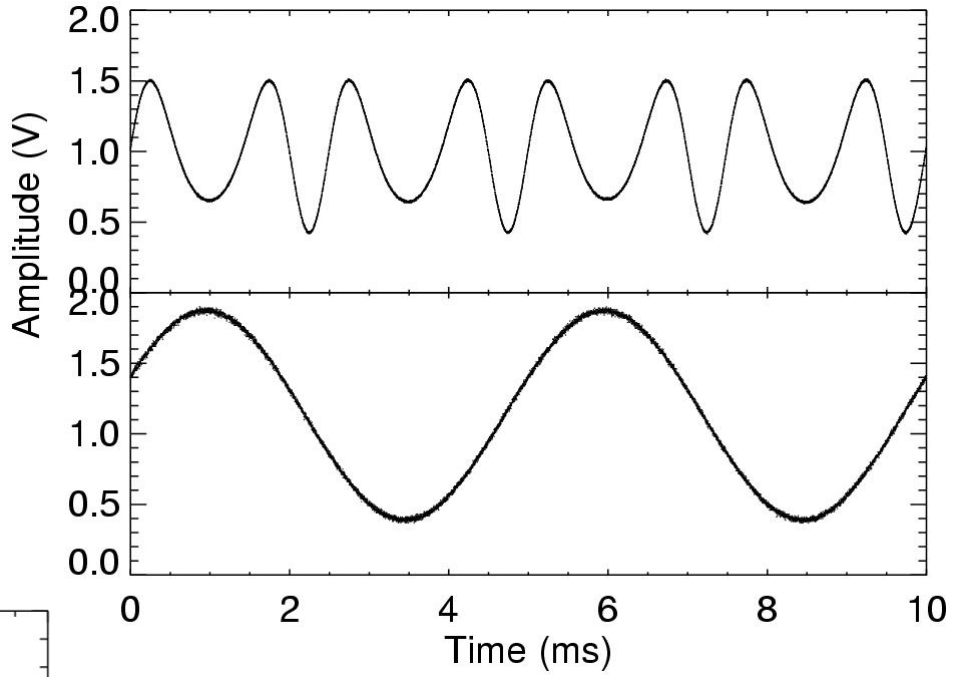


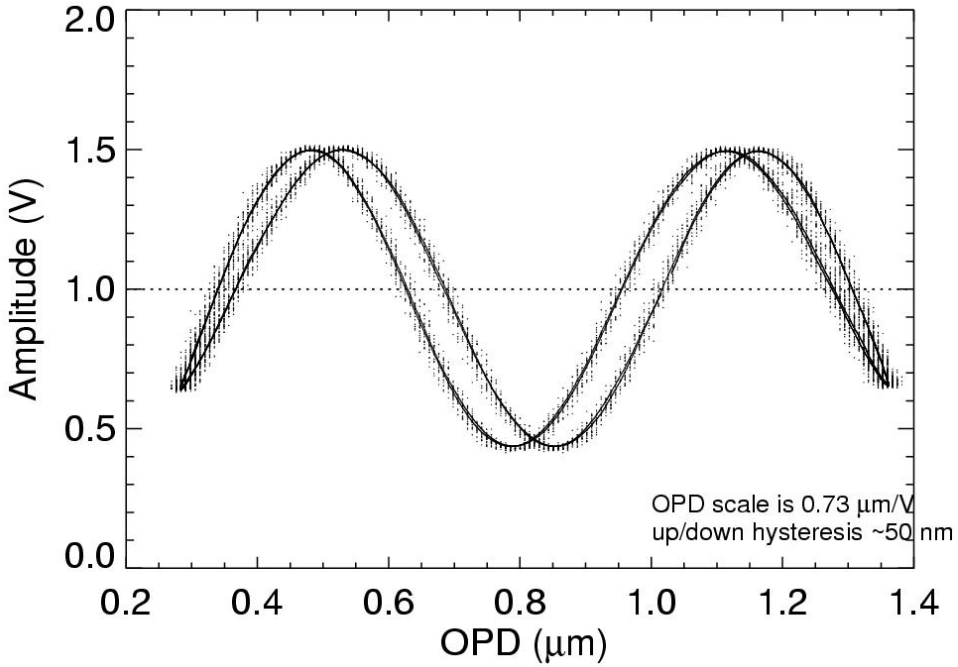
CHAMP @ Michigan




Alignment/Light Source

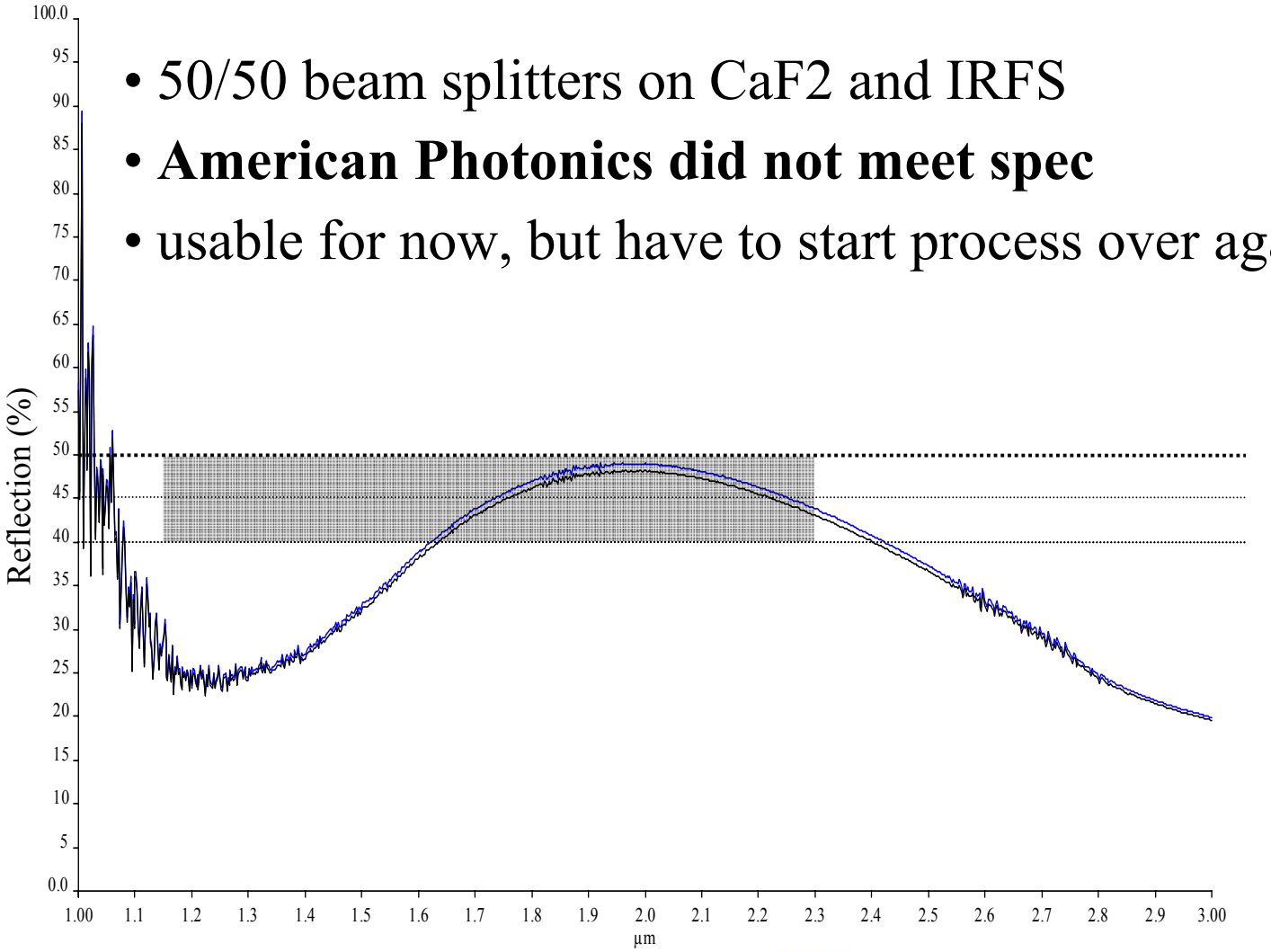
FIRST HeNe FRINGES
2007 Feb 09





Coating Drama: Part I

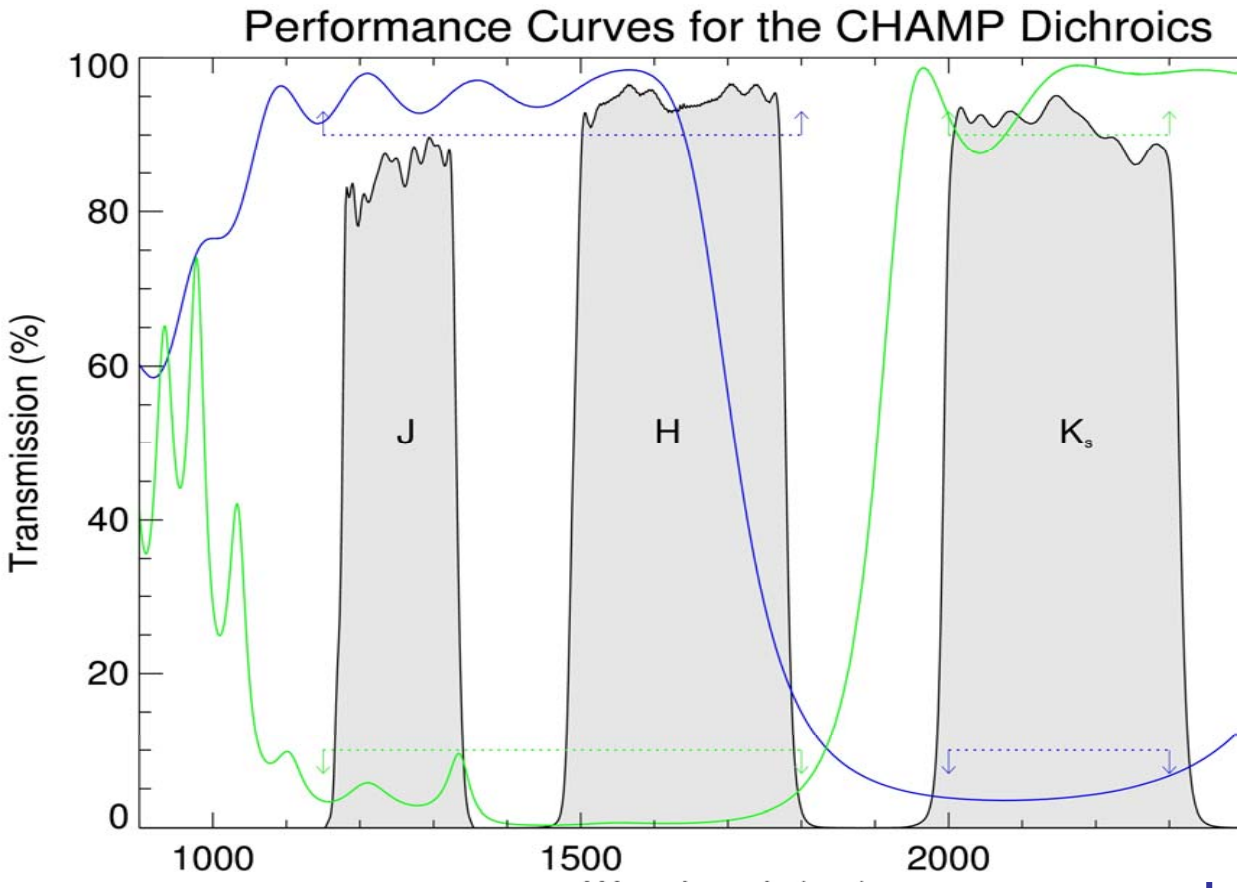
- 50/50 beam splitters on CaF2 and IRFS
- **American Photonics did not meet spec**
- usable for now, but have to start process over again!



Coating Drama: Part II

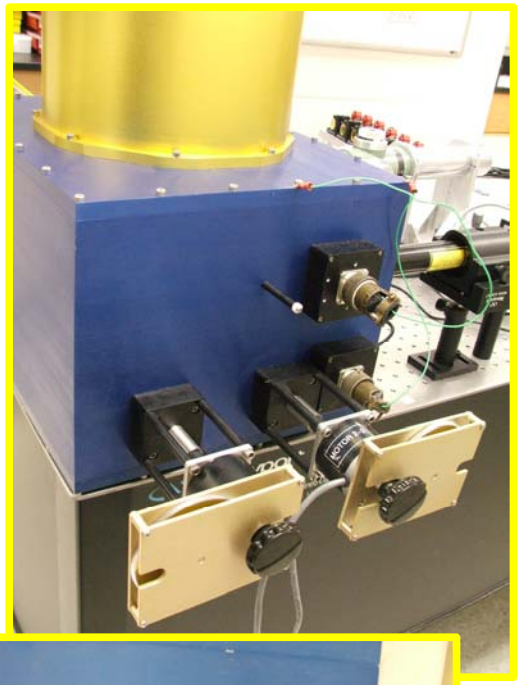
Dichroics

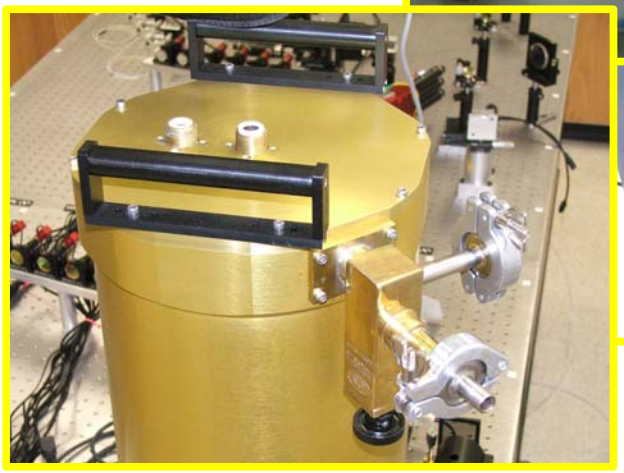
- splits light between CHAMP and science instrument(s)
- Ks-pass (green) OK
- JH-pass (blue) NOT
- awaiting new substrates

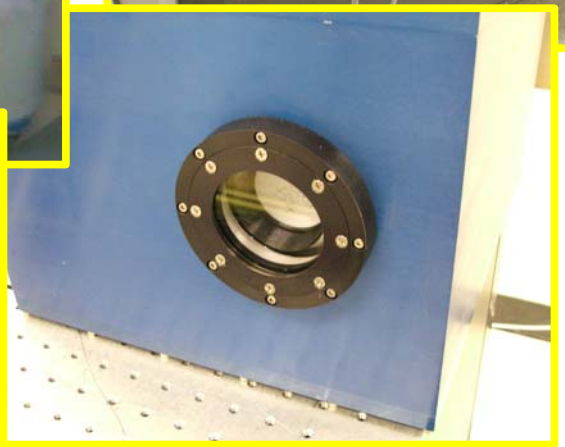


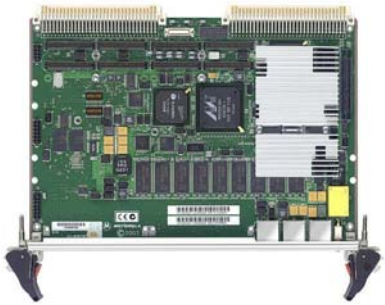
Dewar/Detector Testing

- empty, dewar window installed
- vacuum: ~5 x 10^{-5} mbar
- cold time: ~2 days
- Rafael comes to A2 end the month!









OPLE Communications Update

closing the loop

- MVME 6100 SBC
- VxWorks 6.3
- software/hardware installed Feb '07
- port old code in parallel and transition to a new SBC
- transition to new SBC entirely?

Current Schedule

Winter '06/Spring '07

camera testing

combined beam transport

dewar optics

software!

Spring/Summer '07

integrate camera with combiner and close loop with artificial turbulence

software! software!

Fall/Winter '07

delivery to CHARA; sky testing