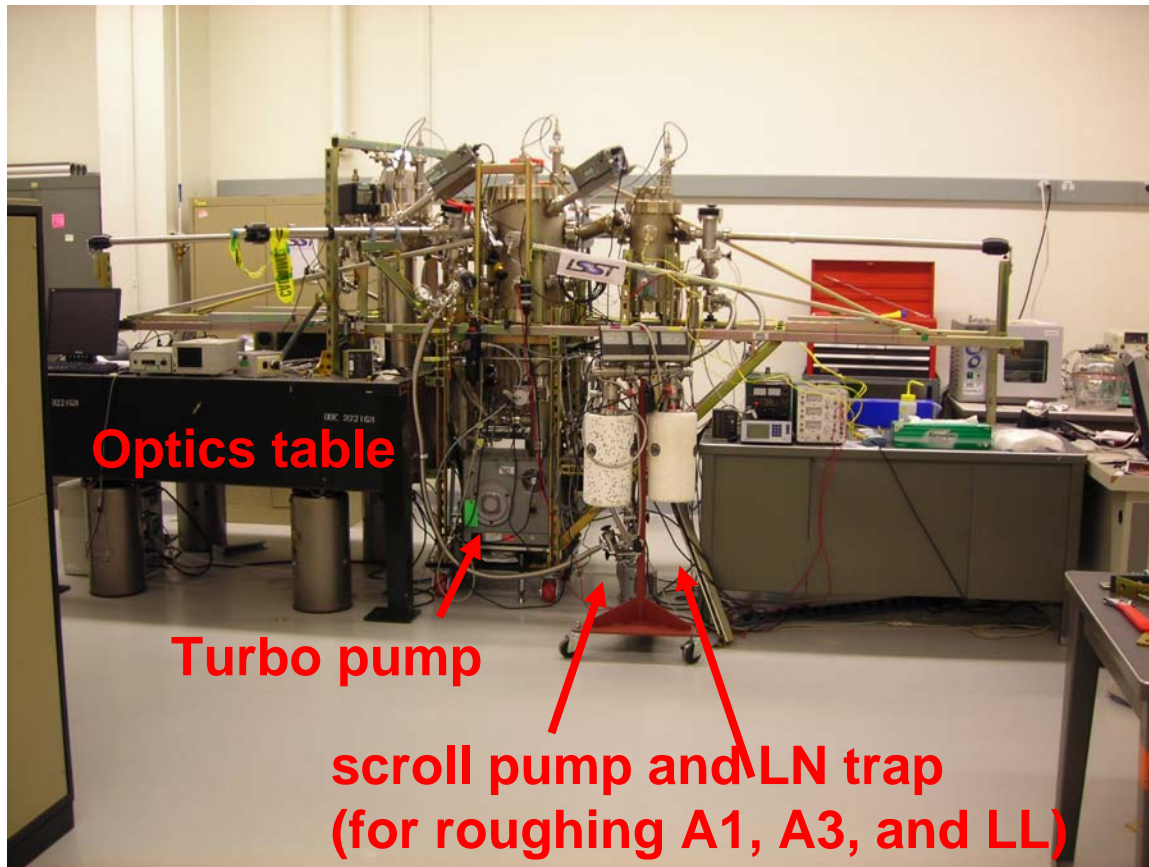
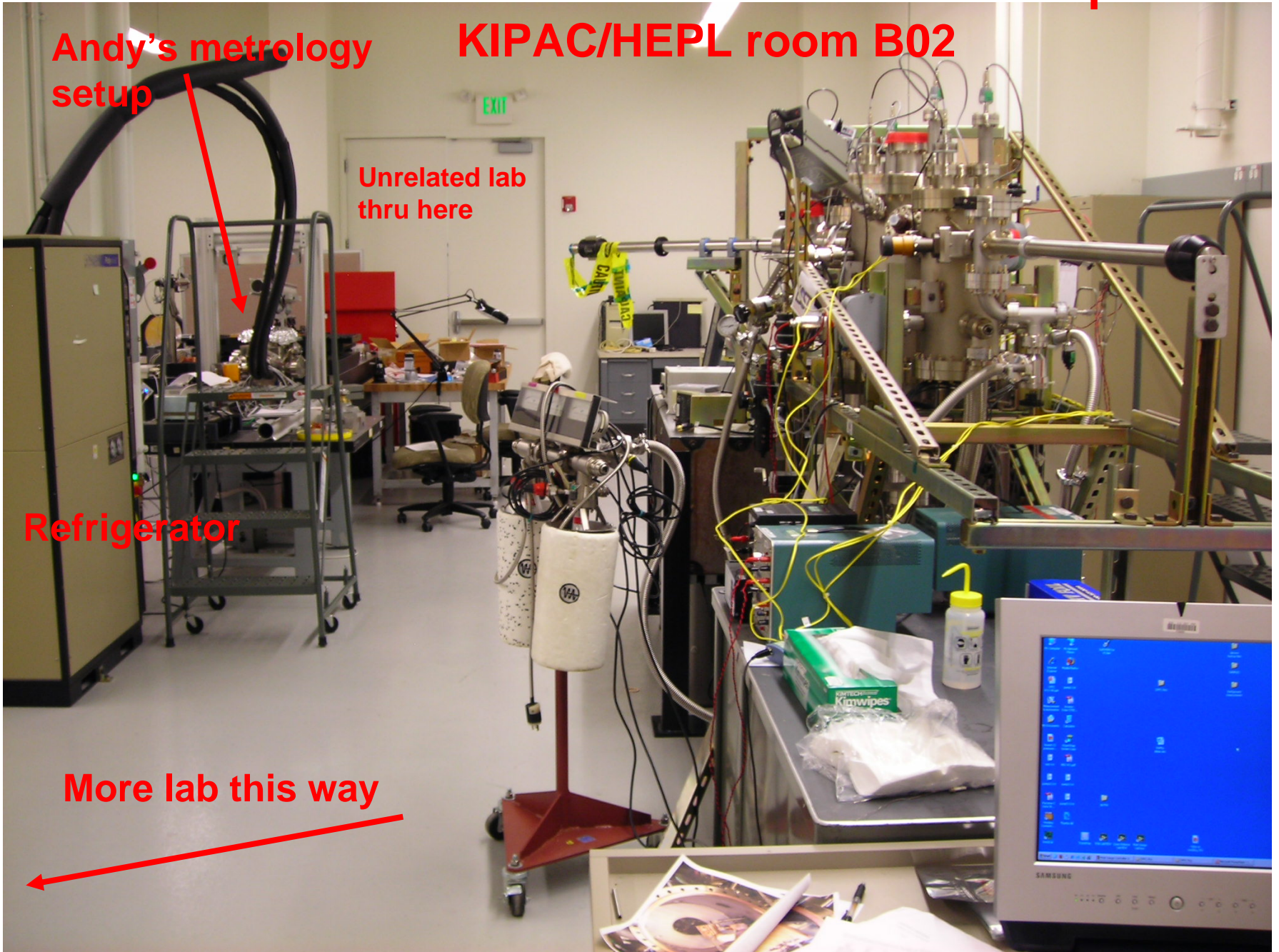


CAMERA MATERIALS TEST CHAMBER



CMTC on Stanford main campus



Andy's metrology setup

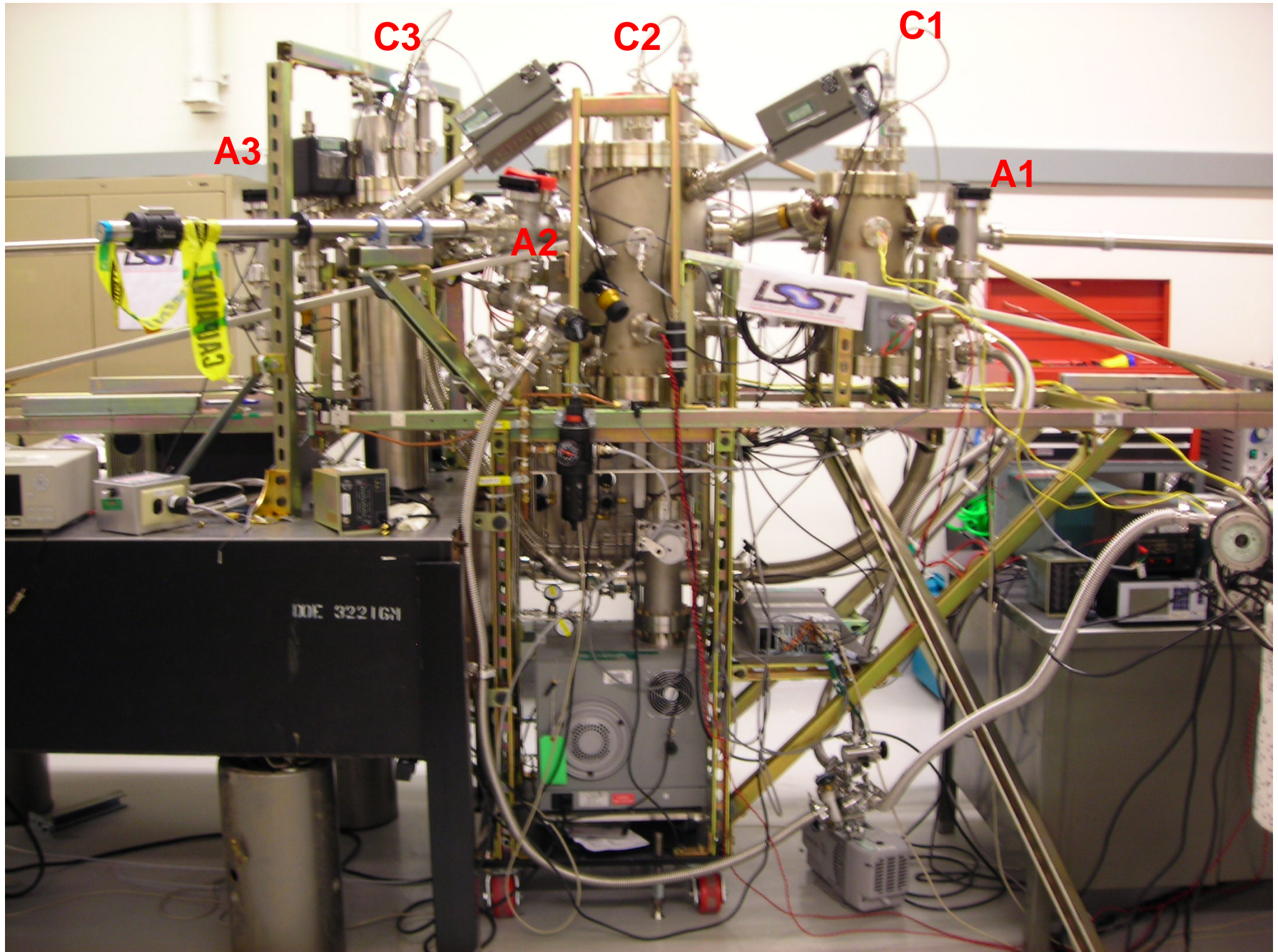
KIPAC/HEPL room B02

Unrelated lab thru here

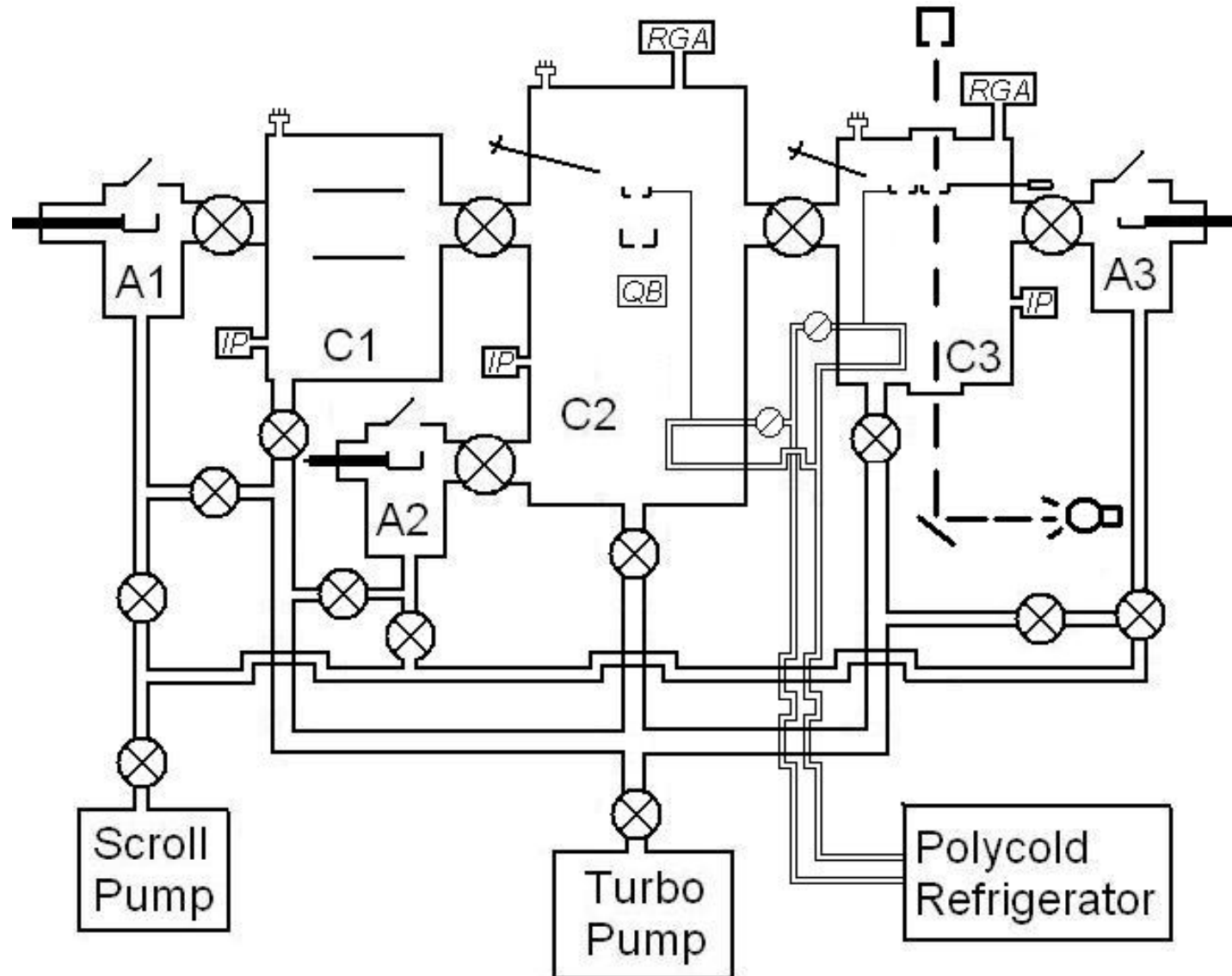
Refrigerator

More lab this way

zoomed view



schematic



~ 1Wk Procedure for Each Sample

| | <u>Action</u> | <u>Duration</u> |
|-----|--|-------------------|
| 1) | Material Sample Entered into Database, cleaned and dried as appropriate | 2 hr |
| 2) | Sample is measured and weighed, and exposed to 50% RH for 24 hrs. Sample is reweighed | 1 day |
| 3) | Sample is baked in vacuum oven at max allowed temperature and reweighed | 2 day |
| 4) | Sample is introduced into A1 | 1 hr |
| 5) | Sample is re-baked in C1 at max allowed temperature | 0 – few days |
| 6) | If necessary, background ROR levels are taken in C2 (time depends on what temperatures are desired). RGA | <1 day |
| 7) | Sample is moved to C2 and placed in sample box | 1 hr |
| 8) | ROR levels are taken in C2 (time depends on what temperatures are desired) | 1 day |
| 9) | Measure deposition in C2 with cold quartz balance monitor | 1 day in parallel |
| 10) | Glass disks introduced into A3 | 1 hr |
| 11) | Glass disk moved to C2 and cooled | 2 hr |
| 12) | Outgassing products deposit on glass disk | 1 day |
| 13) | Contaminated glass disk moved back to C3, stabilize light source | 1 hr |
| 14) | Light transmission through 'clean' and 'contaminated' glass disks measured in C3 | 1 day |
| 15) | Glass disks warm and outgas in C3. ROR measurements vrs temperatures RGA measurements | 1 day in parallel |
| 16) | Glass disks removed through A3 | 1 hr |
| 17) | Sample and box removed through A2 | 1 hr |

Work to complete CMTC

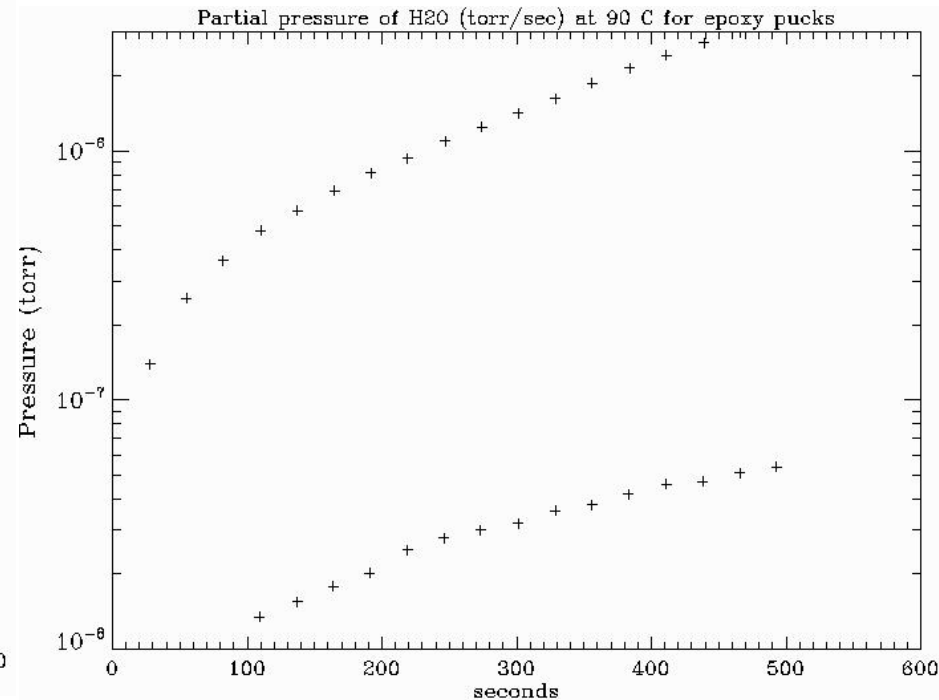
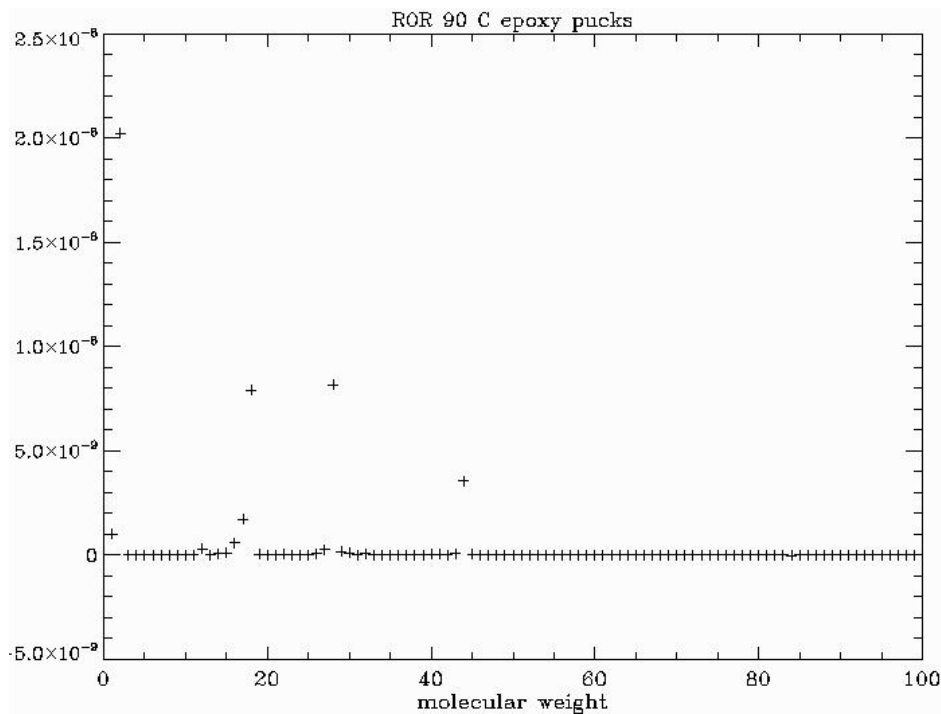
- Connect fluid lines from refrigerator
- Build sound dampening housing around refrigerator
- Commissioning.....microbalance, optical system
- Demonstrate with “dirty” sample ? FR4 ?

Materials to be tested (should discuss priority)

- Feed-thru epoxy (done with ROR)
- Airborn connector
- Misc Boards (with and without coating)
- Misc Cables
- Exposed Solder joints
- Other epoxies
- Misc Wire (thermocouples, etc...)
- ??

ROR results on feed-thru epoxy

- Just the standard products
- No ROR above background level at 20° C, only at 50° and 90° C



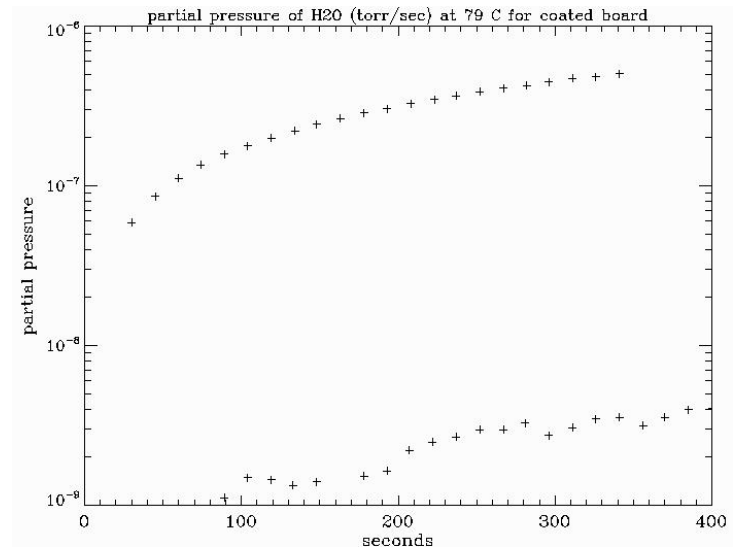
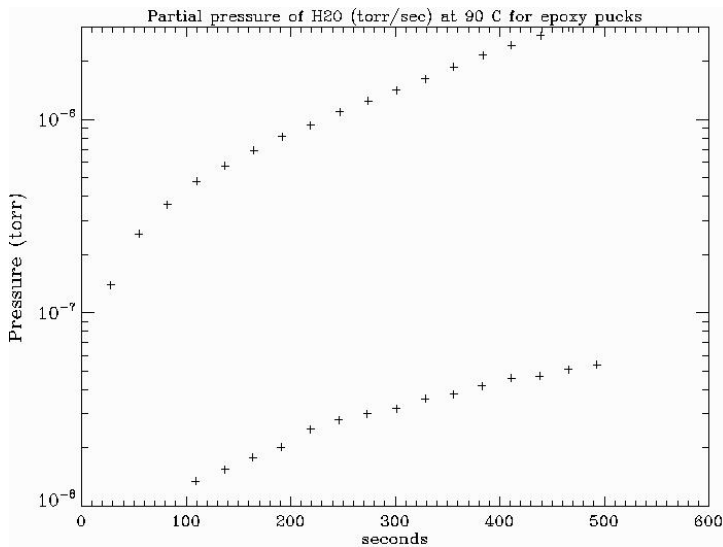
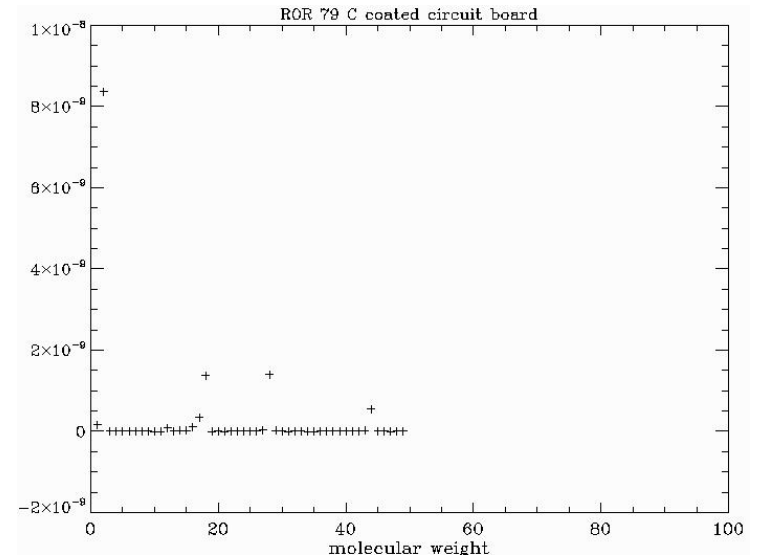
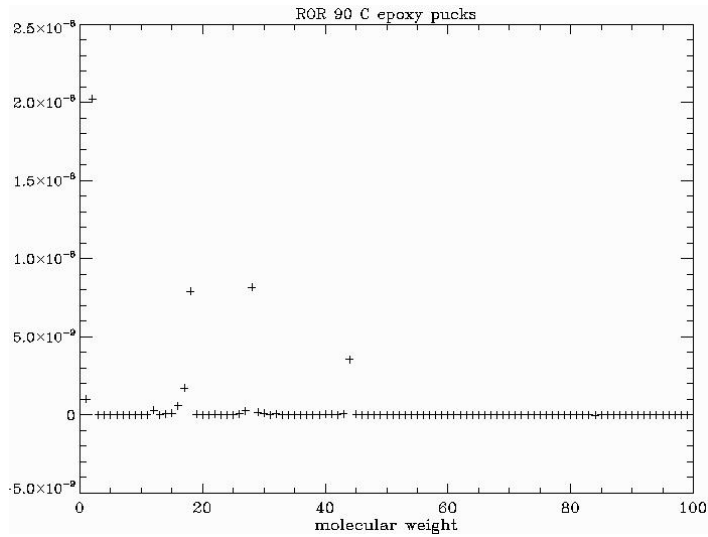
ROR results on feed-thru epoxy

| | Outgas rate 55°C (torr-liters/sec/cm ²) | Outgas rate 90°C (torr-liters/sec/cm ²) |
|-----------------------|---|---|
| H ₂ | 6.2x10 ⁻⁸ | 3.7x10 ⁻⁷ |
| H ₂ O | 1.6x10 ⁻⁸ | 1.4x10 ⁻⁷ |
| N ₂ | 1.7x10 ⁻⁸ | 1.5x10 ⁻⁷ |
| CO ₂ , IPA | 5.6x10 ⁻⁹ | 6.7x10 ⁻⁸ |

Volume of C2: 39.2 liters

Surface area of epoxy puck: 2.1 cm² (2x)

ROR: compare feed-thru epoxy to coated circuit board



ROR: compare feed-thru epoxy to coated circuit board

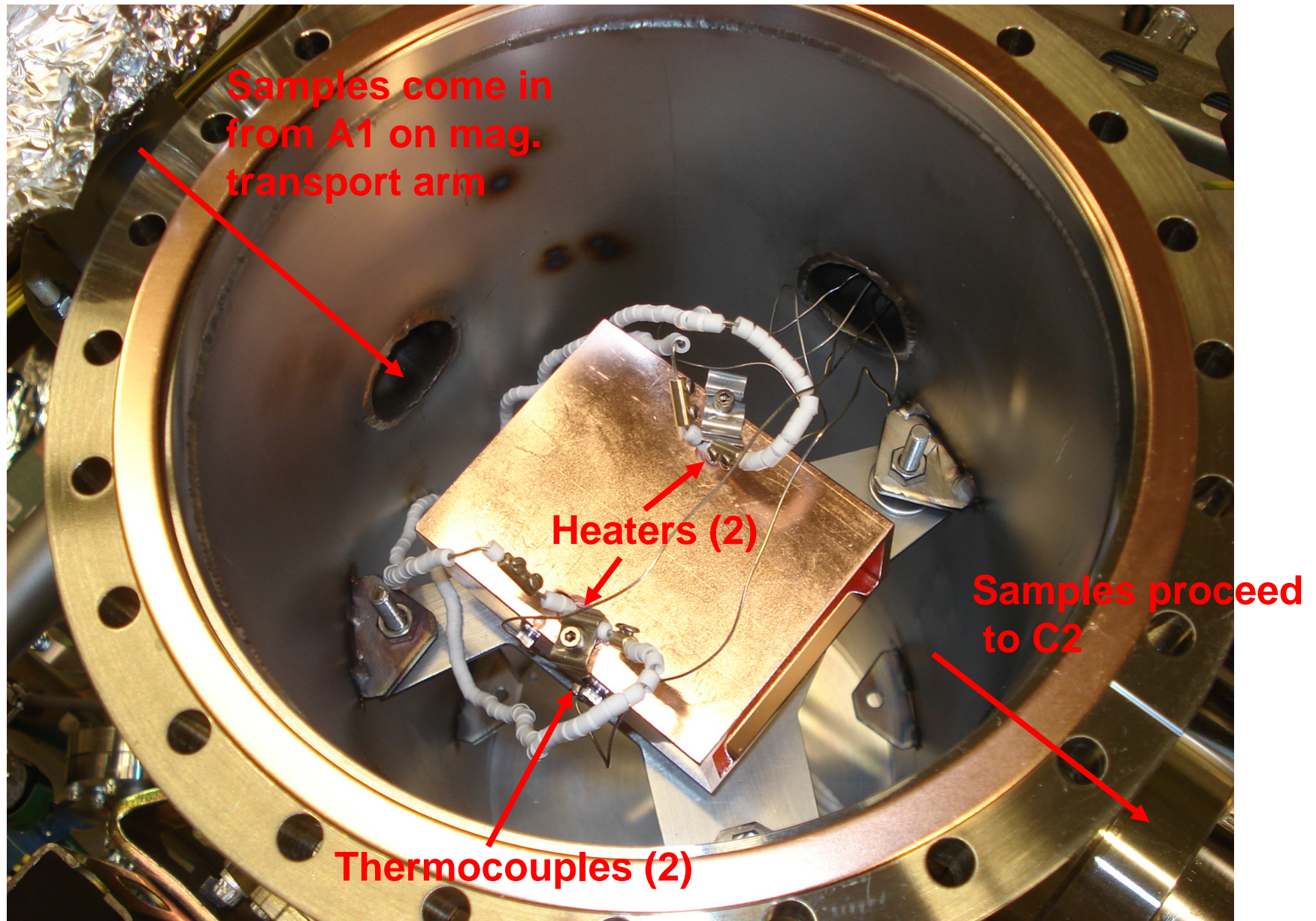
| | Douglas FEED THRU EPOXY | | | Parylene-C COATED CIRCUIT BOARD | | |
|------------------|---|---|-------|---|---|-------|
| | 55°C <small>(torr-liters/sec/cm²)</small> | 90°C <small>(torr-liters/sec/cm²)</small> | Index | 60°C <small>(torr-liters/sec/cm²)</small> | 79°C <small>(torr-liters/sec/cm²)</small> | Index |
| H ₂ | 6.2x10 ⁻⁸ | 3.7x10 ⁻⁷ | 0.9 | 1.3x10 ⁻⁸ | 1.9x10 ⁻⁸ | 0.03 |
| H ₂ O | 1.6x10 ⁻⁸ | 1.4x10 ⁻⁷ | 0.4 | 1.8x10 ⁻⁹ | 3.0x10 ⁻⁹ | 0.06 |
| N ₂ | 1.7x10 ⁻⁸ | 1.5x10 ⁻⁷ | 0.4 | 2.5x10 ⁻⁹ | 3.1x10 ⁻⁹ | 0.03 |
| CO ₂ | 5.6x10 ⁻⁹ | 6.7x10 ⁻⁸ | 1.8 | 8.3x10 ⁻¹⁰ | 1.2x10 ⁻⁹ | 0.9 |
| IPA | | | | | | |

Volume of C2: 39.2 liters

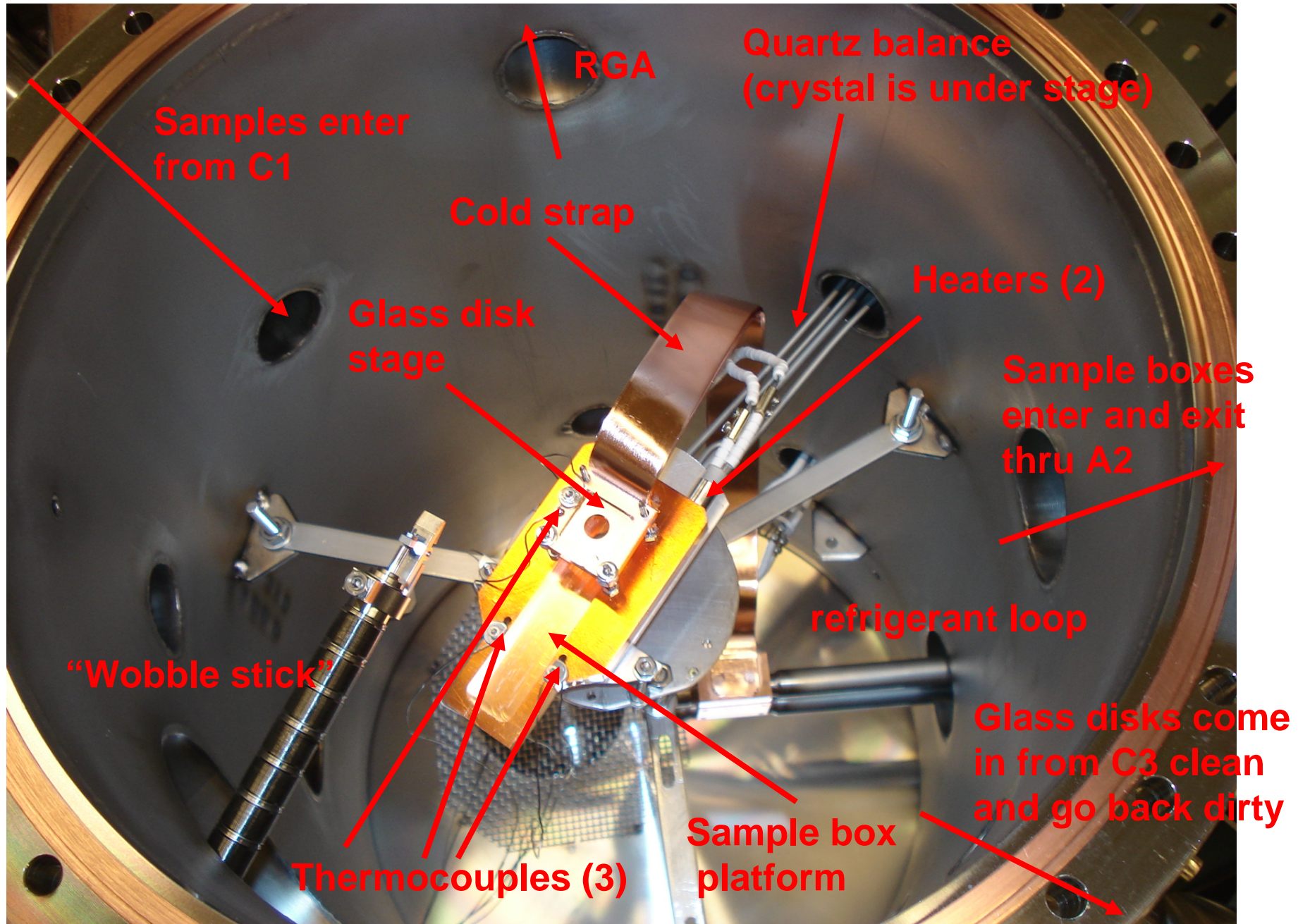
Surface area of epoxy puck: 2.1 cm² (2x)

Surface area of board: 2.6 cm² (3x)

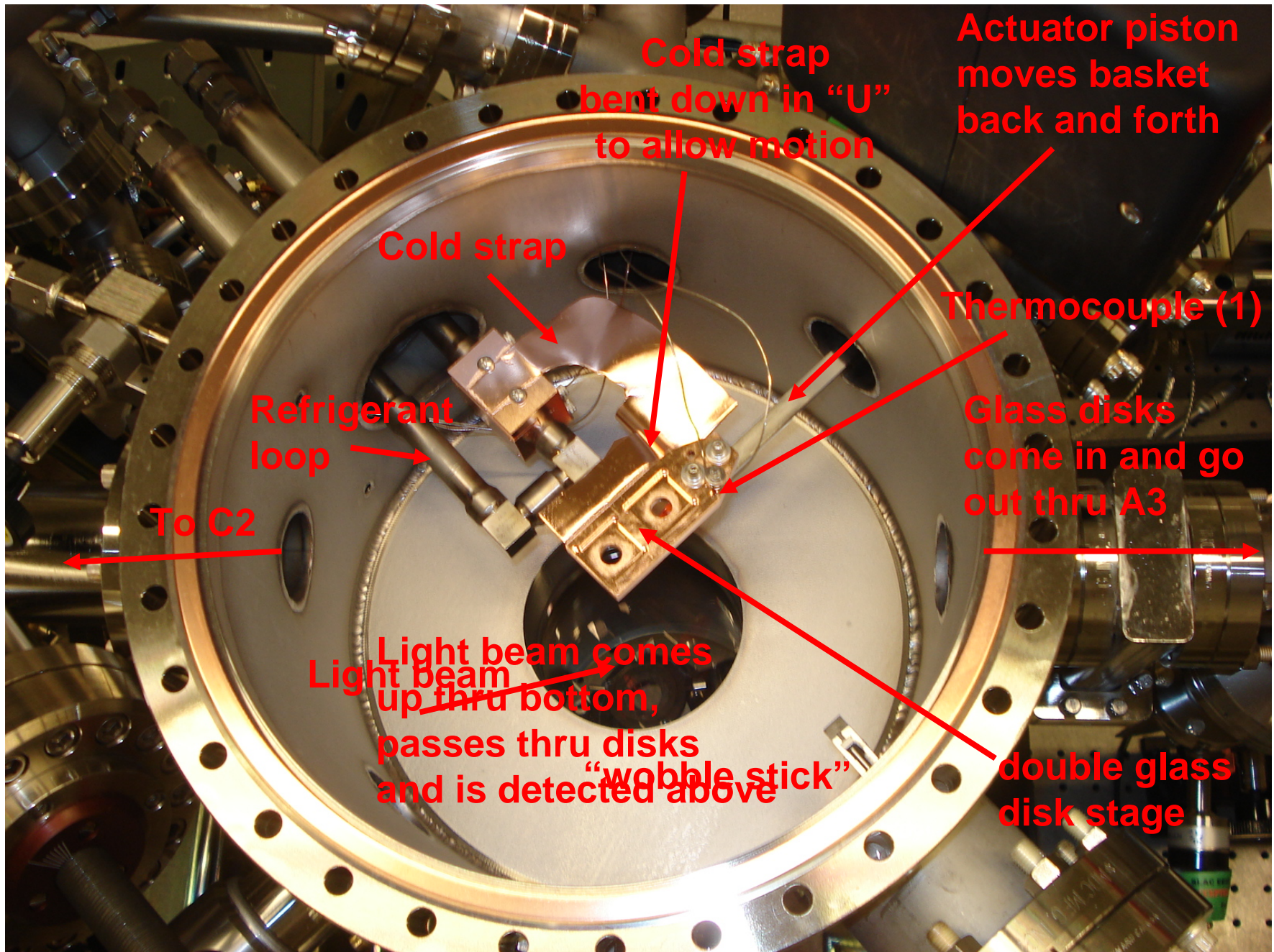
C1 inside view



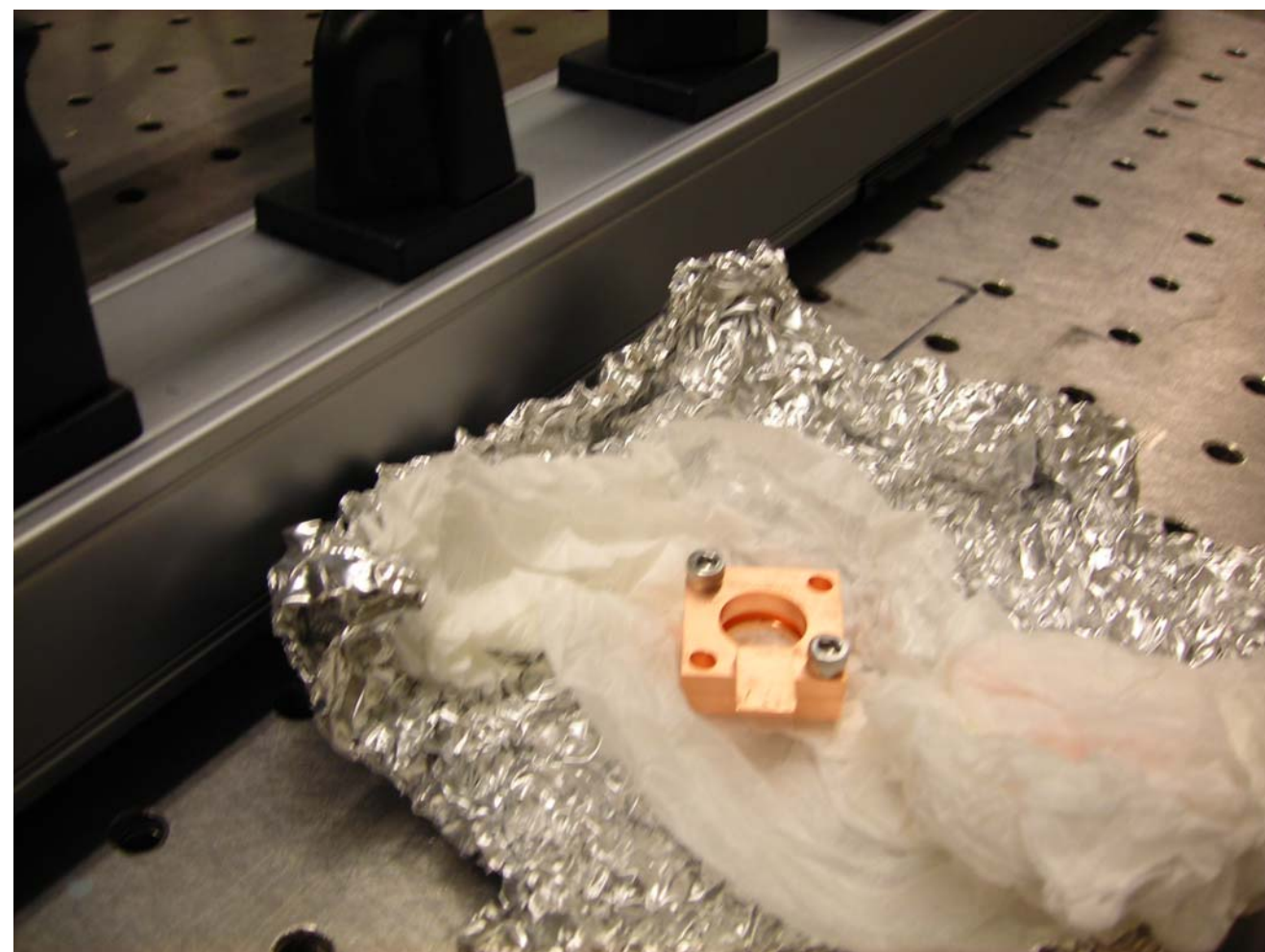
C2 inside view



C3 inside view



Glass Disk Holder and Sample Box



Glass Disk Holder
(clamps glass and sits snugly in baskets)



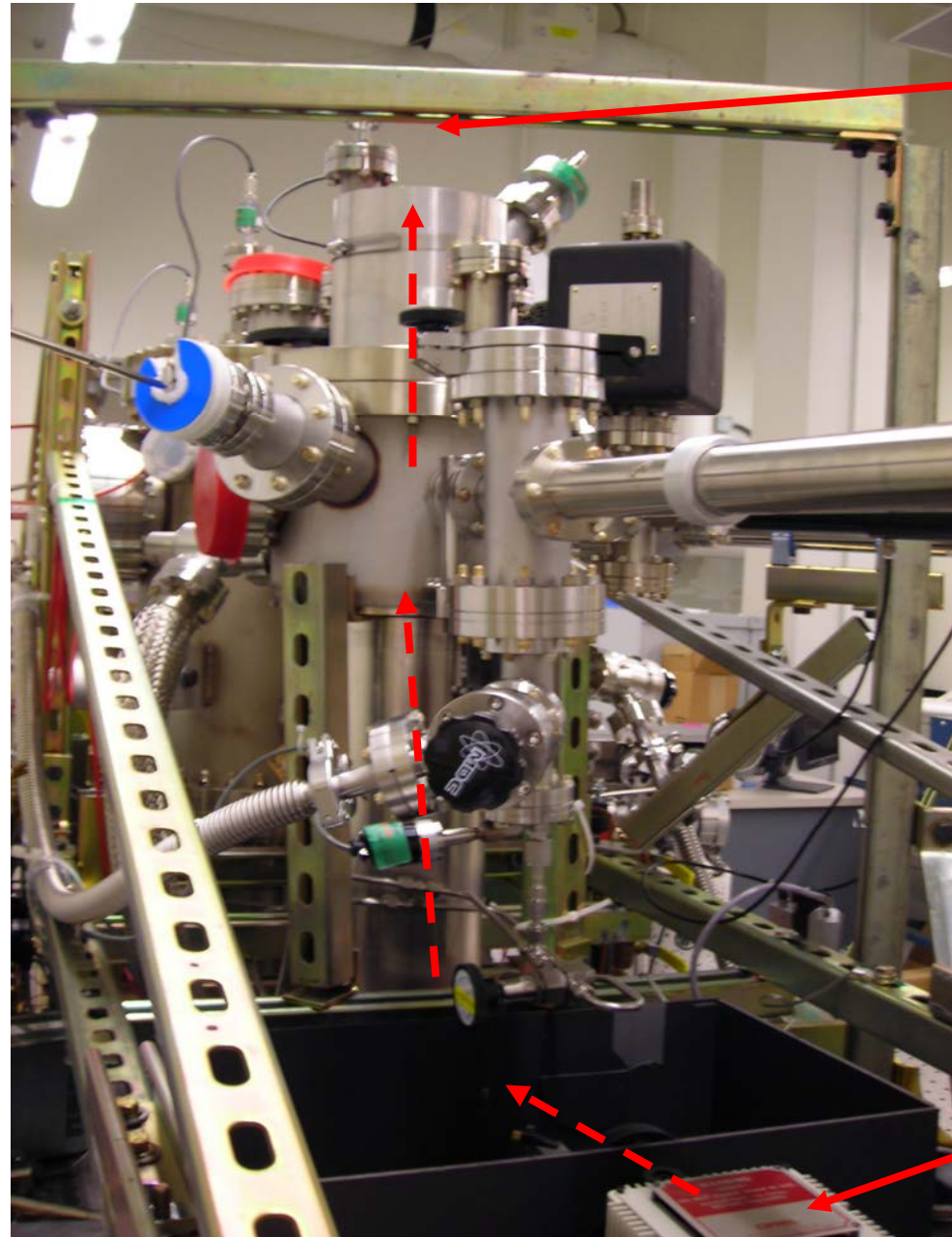
Sample box
(sliding lid and
2 holes for outgassing)

Optical setup overview

Beam goes through glass disks in C3

Repeated with each of 6 band passes:

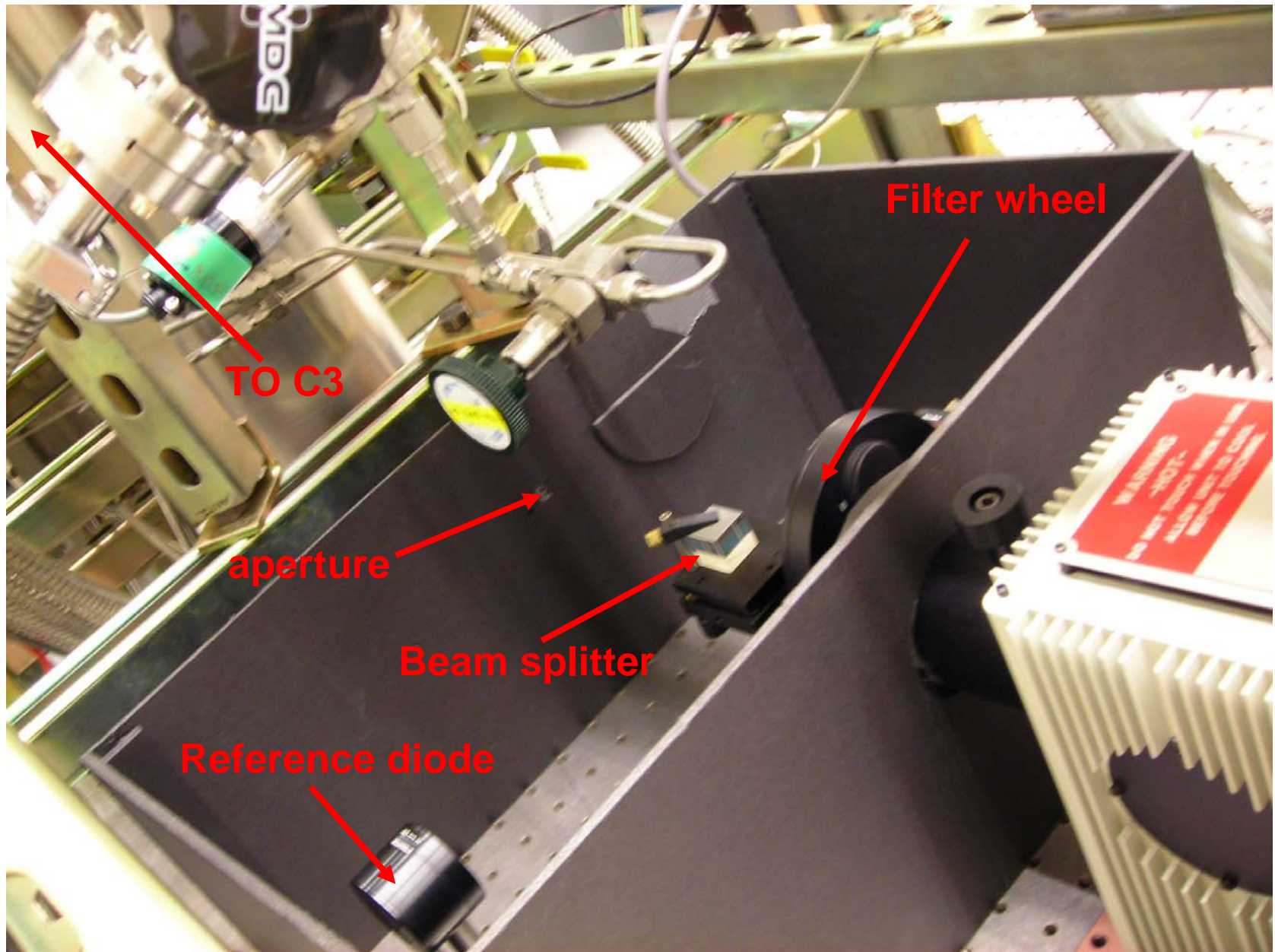
- 400 nm
- 500 nm
- 600 nm
- 750 nm
- 850 nm
- 1000 nm



detector diode mounted here

Light source

Optical setup box



Final picture: some peripherals

Vacuum oven

50% RH environment

microbalance

