The MET1 picomotor can only be accessed via the engineering gui and is highly unlikely to be the cause of a low metrology signal but likely cause of zero met signal.

- If all 6 carts positions are steadily moving or the position is “strange”, then cycle the “metrol” button on the oplerefgui.
- Most of the time when one of the individual signals are just low, its fixed by adjusting MET2. The MET1 alignment stays ok for weeks at a time.
- The procedure for peaking MET2 is on the wiki. It also has some good advice on signals. 150 steps might be a little high now. More like steps of 23 and no more than 150 steps. Do not over do MET2. If the signal does not get better in 150 steps, be sure its back at zero steps before closing gui.

So what is MET1? MET1 describes a fold mirror, Figure 1, that has picomotors (for tip/tilt motion control) on it, that directs the metrology laser beam down the delay line rails. There is one more fold mirror before this mirror also shown; this is the mirror that gets brushed on when rounding the corner, causing a pointing error.

In Figure 1, there is a diagram showing the path of the metrology beam; above it is the front of the delay line cart. For MET1 beam, it is important to know that it goes into the bottom beam hole on the cart. The beam then goes through the cart and comes out the top hole back to MET2 which reflects back the met beam to MET1 and the met beam launcher.

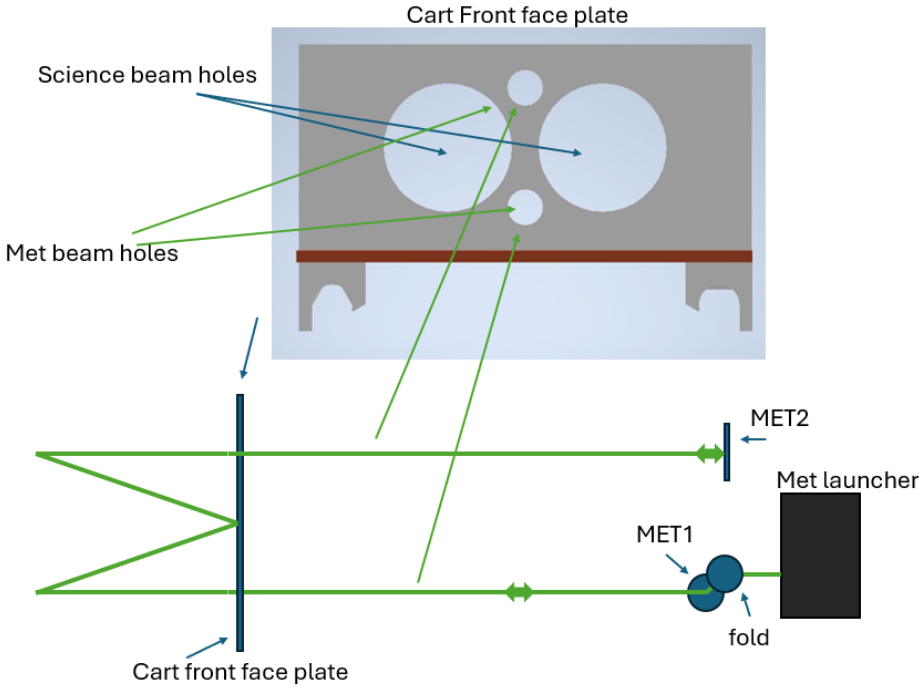

Figure 1: metrology beam path: the bottom schematic is a vertical cross section through the middle of the cart and beam.

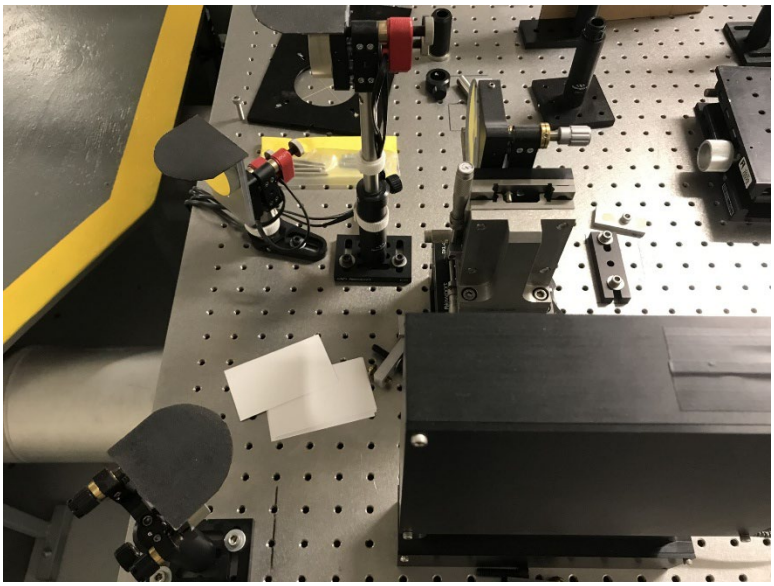

Figure 2: This view is from above and is in a plane almost perpendicular to the schematic in Figure 1. Met1 is below MET2 with the fold mirror visible in the lower left corner. That's why its bumped alot.

Now that you know the beam you are looking for is the one that goes into the bottom hole, you can align the beam.

It is about 4 inches above the drive rail which is the middle rectangular rail. Since the fold has been bumped, the beam is usually off left/right.

We could use the green laser but there is a finite amount of times the fibers can be removed and then reinstalled without damage. Using the IR beam means no coupling.

And its not hard.

Lets review a few tools: The IR detector card in Figure 3 is the most important tool required.

The red book holds all the numbers for metrology for each check. Gives you an idea of the signal you want to get.

The goggles are needed for eye safety.

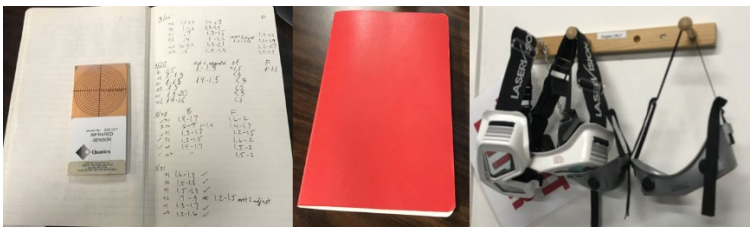

Figure 3: The little red book and the IR detector card on the left; laser safety goggles on the right.

The IR detector needs to be charged with visible light but has enough time to make alignments in between. Just charge with flashlight when needed for about 10 seconds.

1. Put on the laser safety goggles that allow seeing visible light. Enter lab at DL's.
2. Find the metrology beam. Look for it at the lower window on the cart. Hope fully by running the card side to side at the height of the lower window in cart, you will find beam. If not, try up/down.
3. If for some reason the beam can not be found near the hole, go back to MET1 mirror, and follow the beam to the cart, using the IR detector card to keep track of the beam.
4. If the beam is within 1 inch of the hole, use MET1 mirror picomotors, "picogtk -E PICO_2", to use the MET1 picomotor for that beam to move the beam to the center of the hole.
5. If the beam is outside of 1 inch from the hole, use the corner fold mirror to manually move the beam closer to the hole, until the picomotors can be used.
6. Center the beam by aligning the middle of the beams to the center of the bottom hole.
   In Figure 4, are the E1 and E2 beams. E2 is similar to all other beams (except E1) and is much larger then E1. E1 launcher seems to be glued to not be adjusted for collimation so the beam is what it is.

   Figure 5 shows how using the edge of the IR card to find the beam center line vertically and horizontally. I usually bisect the beam with the bottom or side of card then using a flashlight, see if the edge of the card (which you just used to bisect the beam) is centered with the hole. Need clarification?

7. Once MET1 is aligned, now we need to do MET2. Hopefully it was not misaligned, almost always there is a small signal which can be optimized using MET2 picomotor after a met1 fix.

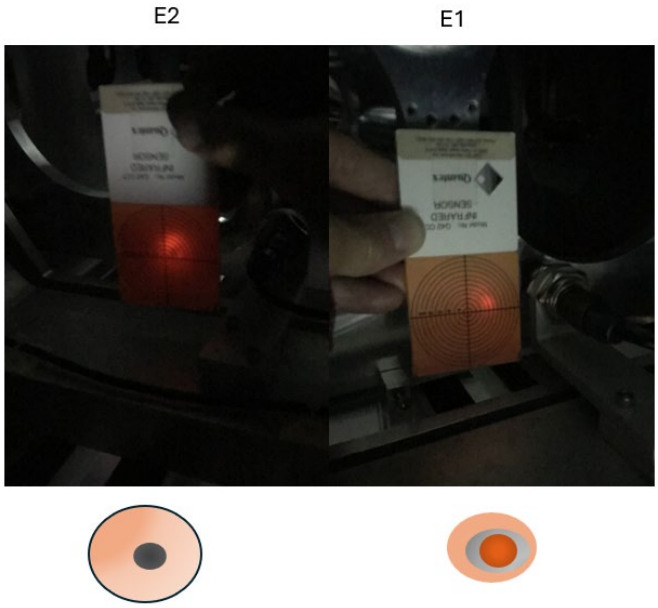

Figure 4: Beams from E1 cart and E2 cart showing the different size of beam. Below the images are rough copies of the beams

Figure 5: Showing how to check the beam using the edge of the card. One important step is now shown very well. Once the center of beam is set to the edge of the card, you need to look to see if the edge then lines up to the center of the hole.