MICHELSON INTERFEROMETER

An interferometer is a kind of setup that's typically used for examining optical components and instruments to see that they don't deviate from proper operating conditions. There are actually many different kinds of interferometers used for many specific kinds of testing.

The Michelson interferometer of the following experiment serves to show up any air drafts (even your breath or the warmth of your hands) which may be flowing over the isolation platform and creating a disturbance.

The way it works is that we precisely match up two separate optical paths against each other, and if the air in the one path ever gets disturbed relative to the other, we'll see undulating fringes (rippling and moving) being projected out of the interferometer.

Something to remember: Provided the fringes you see don't move too much, you can be confident that your air environment provides a good enough place for a holography lab – your optical paths atop the isolation platform won't be prone to disturbances.

Alignment Checklist

1. The portion of the beam that the beamsplitter reflects will strike mirror M_1. The transmitted portion strikes M_2.

2. Mirror M_2 reverse-reflects the beam and makes it retrace its way back over exactly the same path, back to the beamsplitter and back to the laser.

3. Fine-adjust mirror M_2 while holding a piece of paper up in front of mirror M_1. There will be a number of light beams (of various sizes) striking the paper, but by proper adjustment of M_2 you can make several of these beams merge into a single spot of light on the paper. Then readjust M_2 slightly until the second-brightest spot strikes just above the brightest one.

4. Microscope objective L_1 is used to spread out the light beam that exits from the interferometer, with the result of displaying the light broadly onto a piece of paper held in the plateholder. If the light beam is too high or too low where it strikes the microscope objective, then you should fine-adjust the beamsplitter to correct this problem, and while doing so hold a piece of paper in front of mirror M_1.

5. Now, with a piece of paper held in front of M_2 instead, adjust M_1 to merge the several spots that overlap on this paper, and then readjust M_1 slightly until the second-brightest spot strikes just above the brightest one. This will simultaneously make the brightest beam reflected from M_1 transmit out through the microscope objective L_1 to illuminate the paper in the filmplate holder.

6. Remove the paper from in front of M_2, and tilt M_1 slightly left or right until vertical fringes appear on the paper in the filmplate holder.