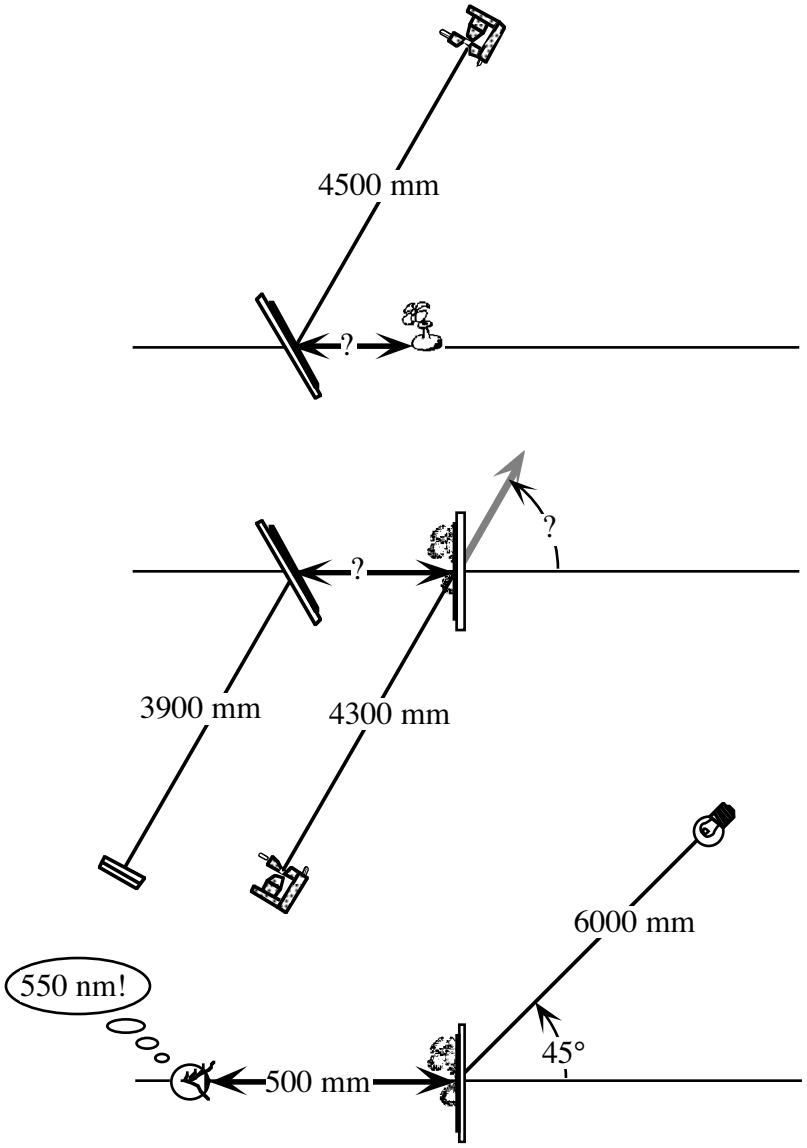
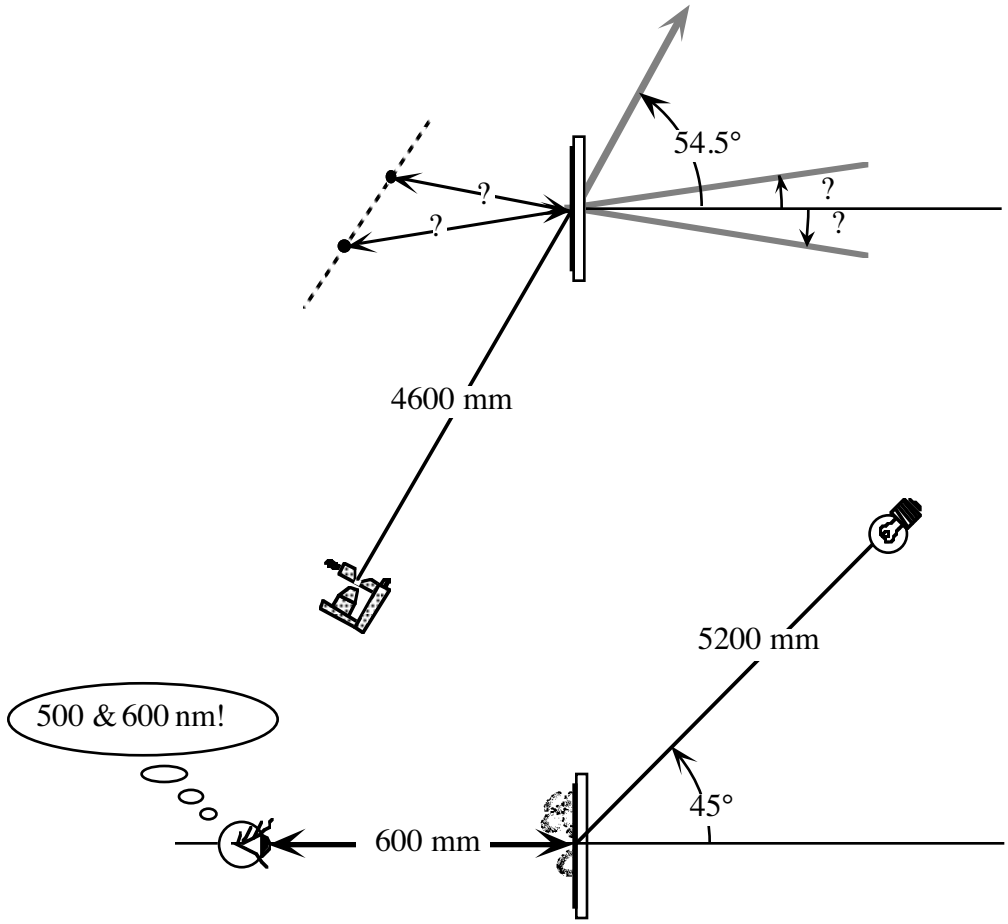
MAS 450/854 Holographic Imaging
Prob. Set #4: Full-Aperture Transfers & White-Light Transmission Holograms
Due: Lecture 18

U1) An image of a point is 100 mm behind a full-aperture transfer hologram illuminated with white-light at 60°. How far from the hologram must a viewer be so that the separation between the images formed in 500 nm and 600 nm light is invisible (assume visual resolution of one minute of arc). What diameter of illuminating light source 5 meters away will blur the same image points together?

U2) An 8"x10" rainbow hologram is designed to be illuminated from about six meters away at forty-five degrees above, and seen from straight ahead in 550 nm "green" light, per sketch C below. The longest beam throw available on the table is just over four meters, which limits the He-Ne laser reference and projection beams per sketches A and B. Determine the central object distance, the H1-H2 separation, and the H2 reference beam angle (using a thin hologram model); that is, complete the mastering and transfer setup designs, **with diagrams showing all distances and angles**.
(All exposures for both problems are made at $\lambda = 633$ nm)



U3) Find the master slit locations needed to produce “blue-green” 500 nm and “orange” 600 nm images on-axis, per the sketch below. Find the angle of the line connecting the two slit locations.



G3) no special problem for gradate students this time!