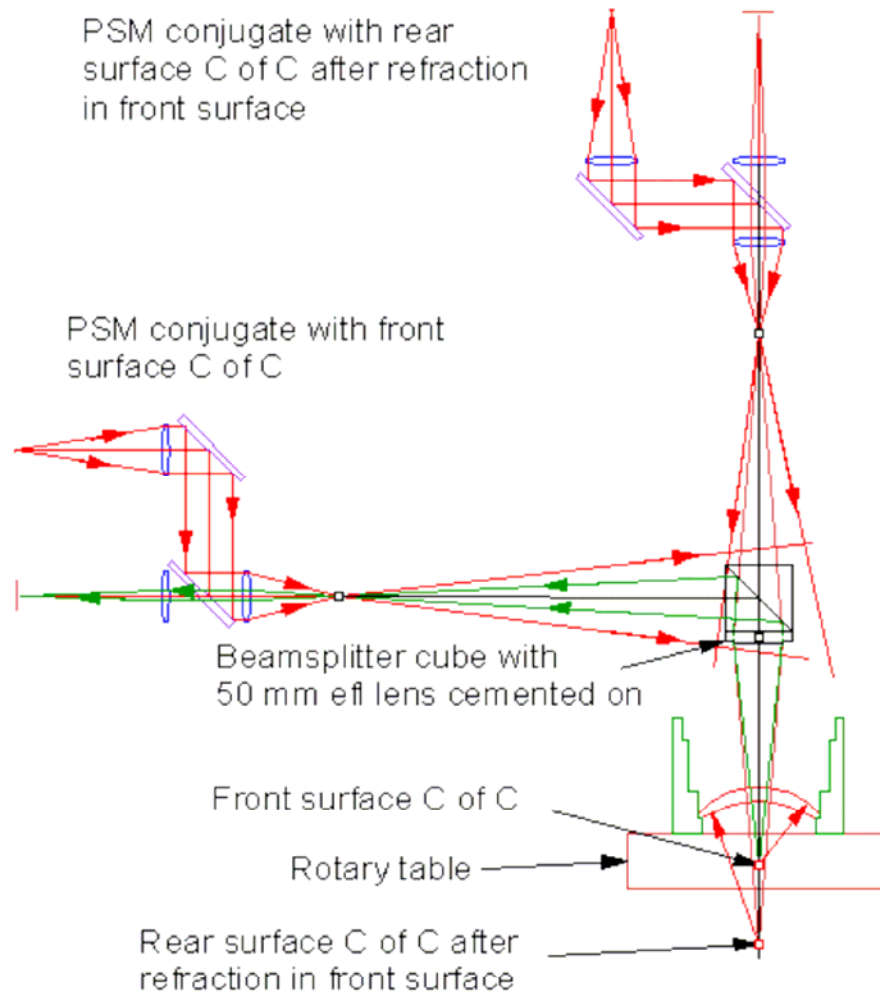


System alignment

Non-centered systems

Use rotary table to center



Rotary table produces an axis as it rotates

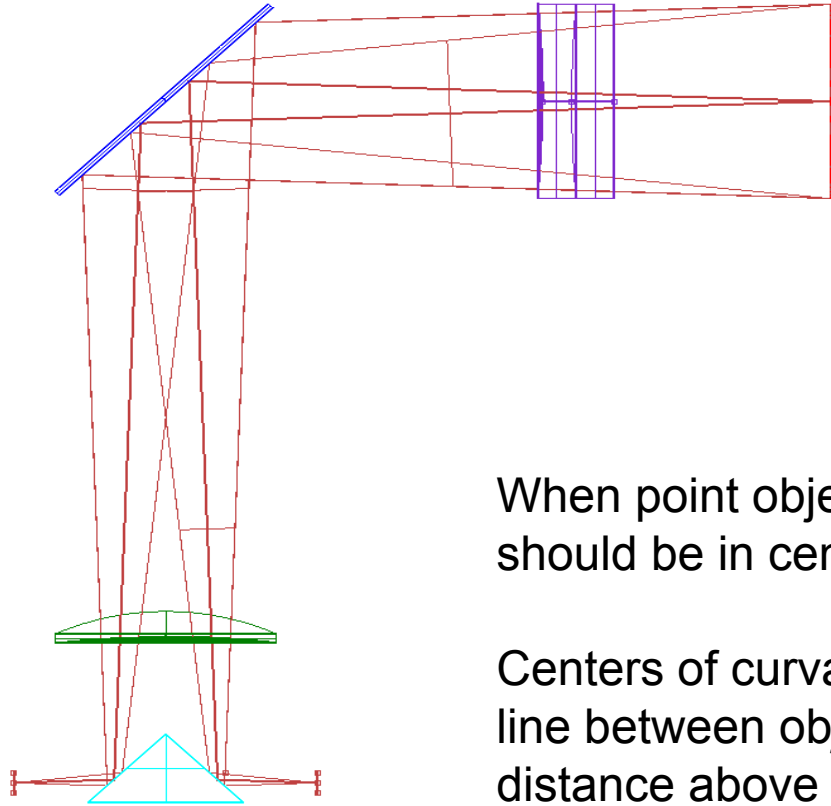
If C of C does not lie on table axis, image moves in a circle

Center by getting both images to be motionless

Then C of C's lie on table axis

Table axis and optical axis coincident

Non-centered system



Alignment not so simple

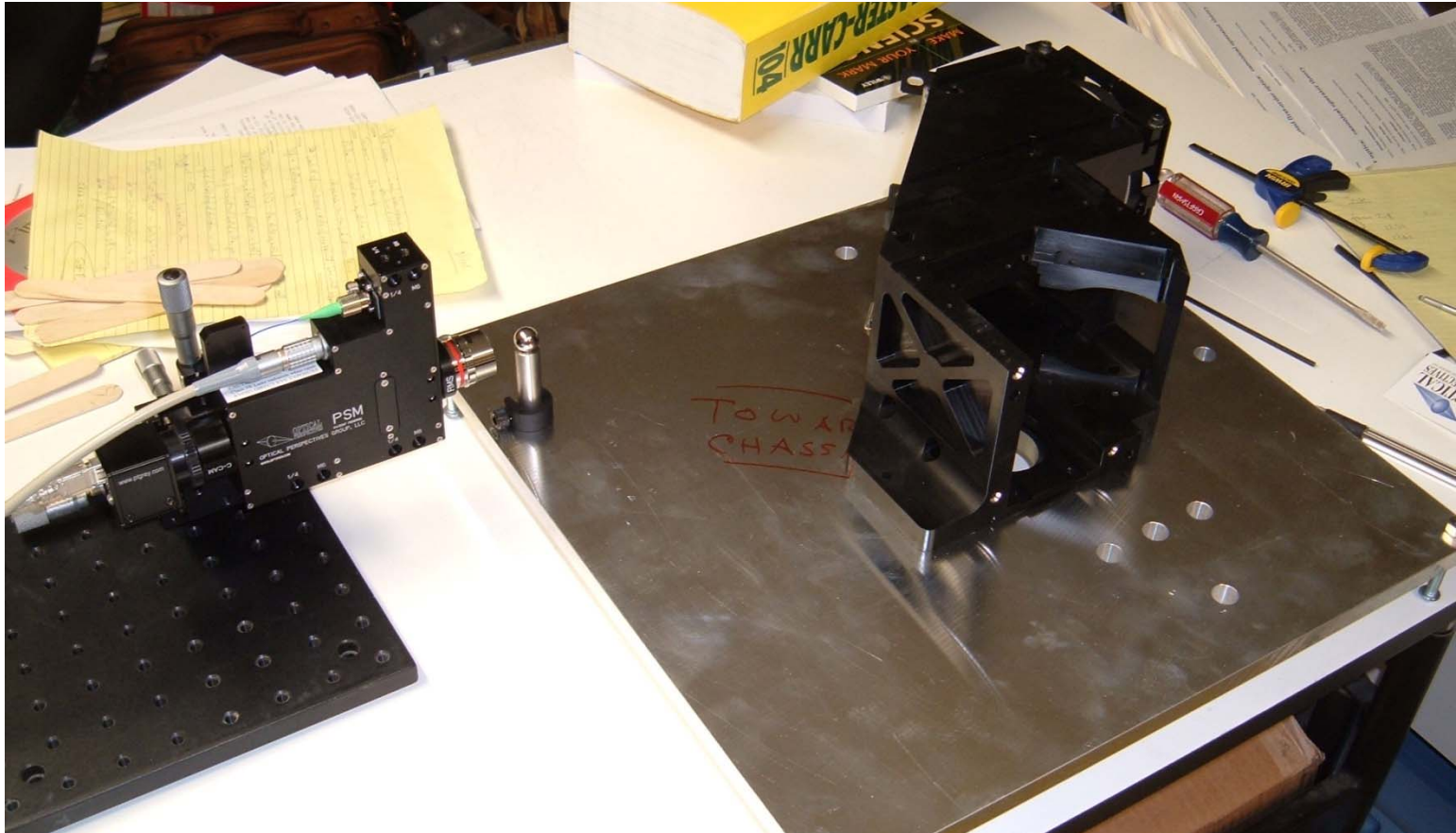
Want tight control over object and image positions

Line between center of field for object and image is the axis to which elements will be aligned

When point object is in center of field, image should be in center of field unaberrated

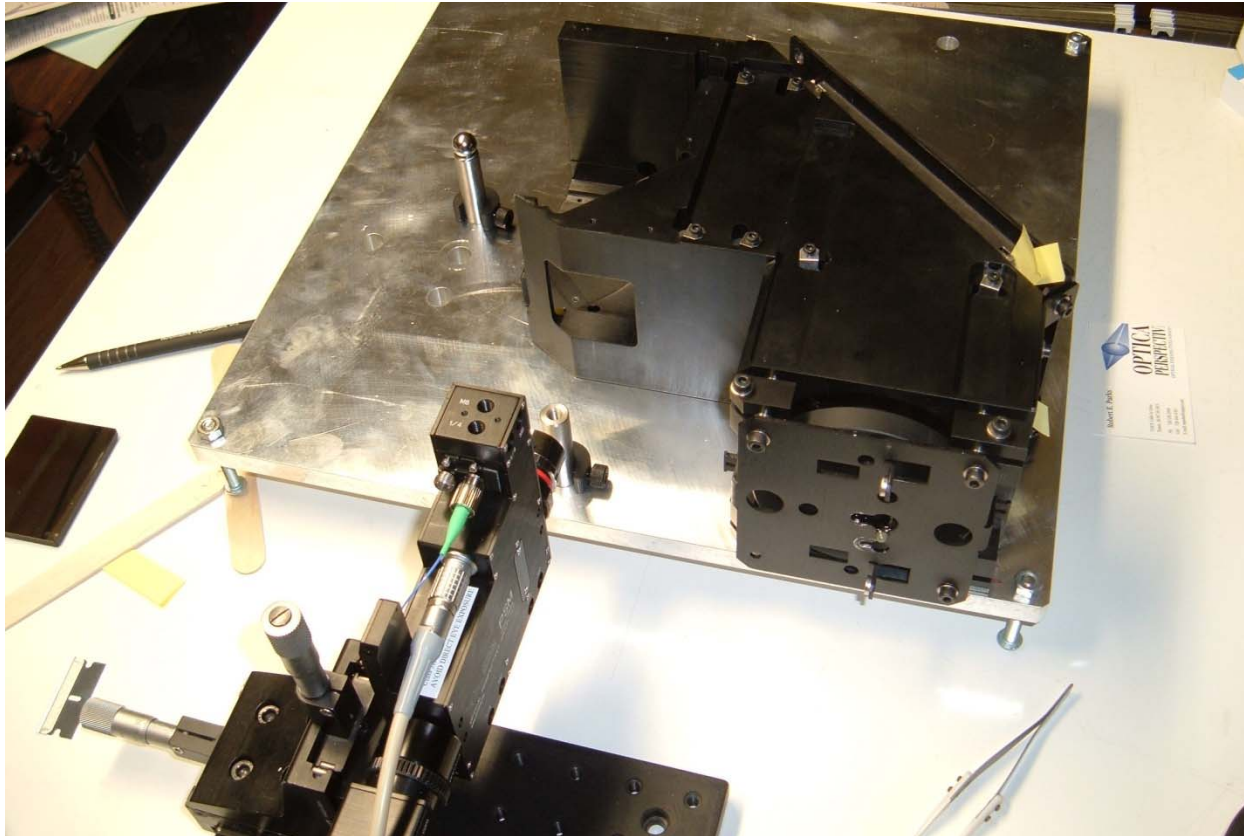
Centers of curvature of elements should lie along line between object and image and be that fixed distance above the plane of the page

Idea of alignment fixture



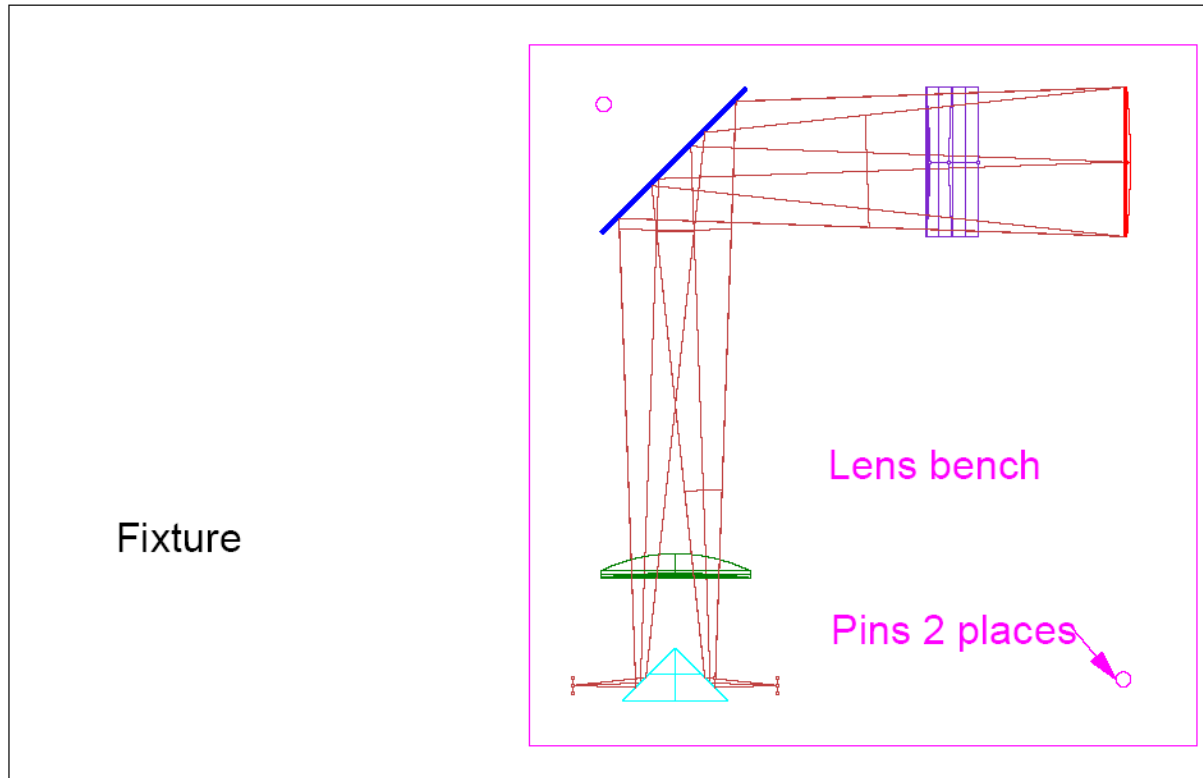
Alignment of first mirror, lens bench pinned to fixture, Al plate

Idea of alignment fixture - 2



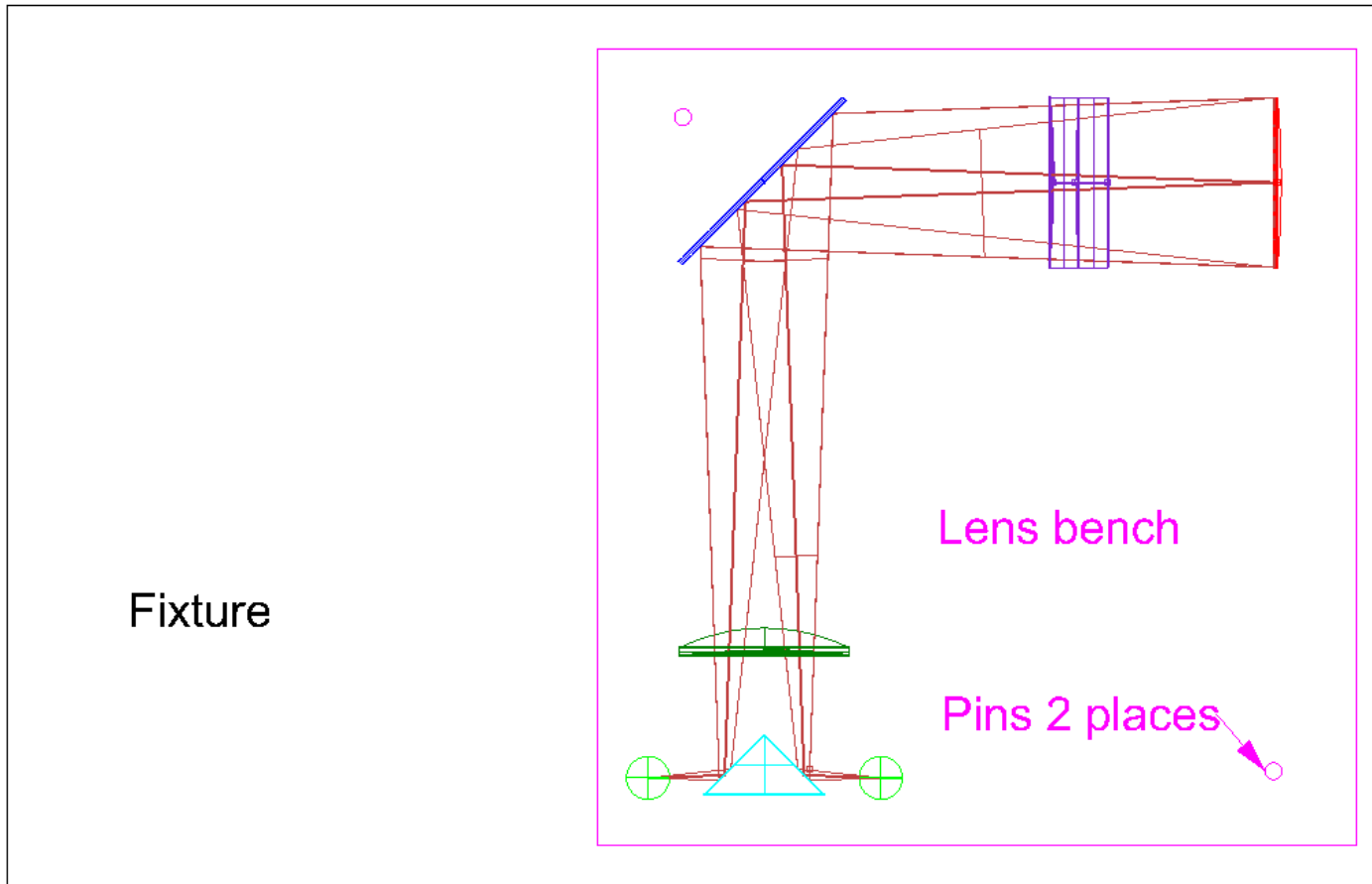
Final step of alignment, light going in as object, reflecting off ball at image plane and returning to microscope unaberrated
Collar on post ball holder keeps constant height above fixture

Example system on fixture



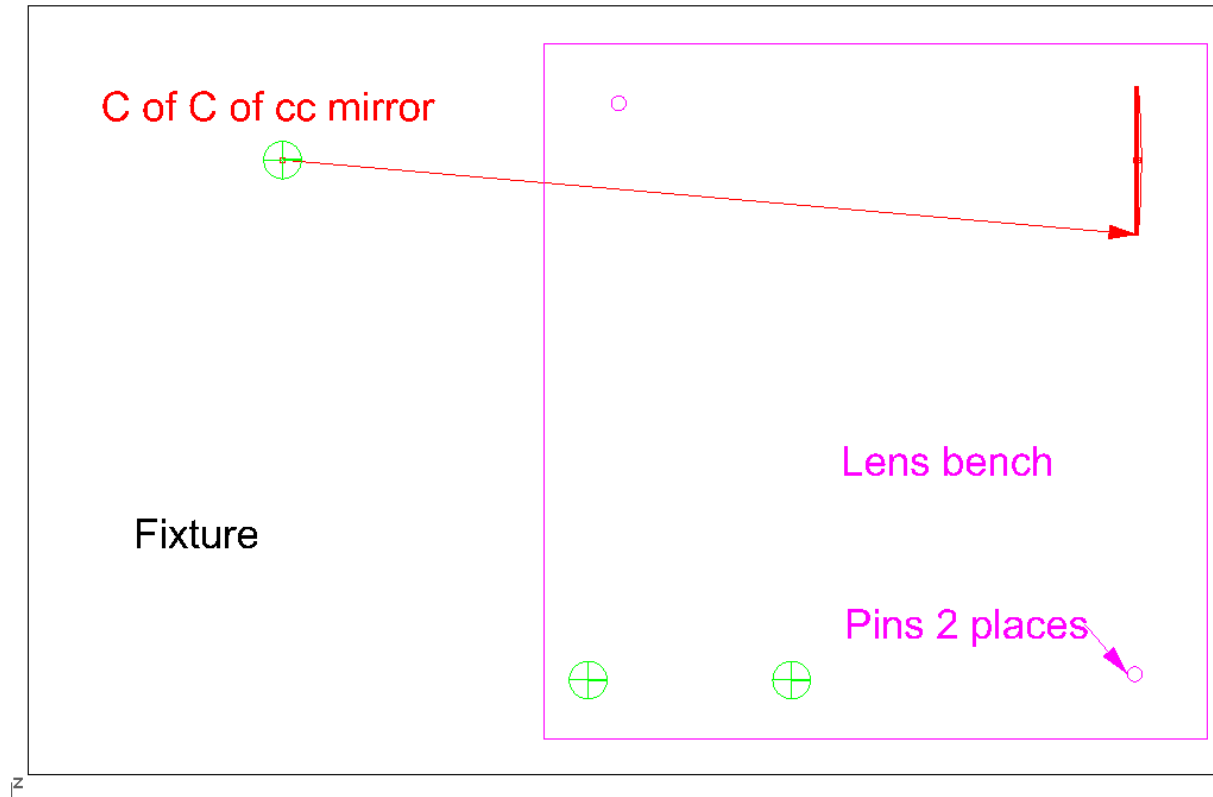
Fixture bigger because of need to get to C of C of cc relay mirror
Pins hold lens bench to fixture plate

First step locate axis of system



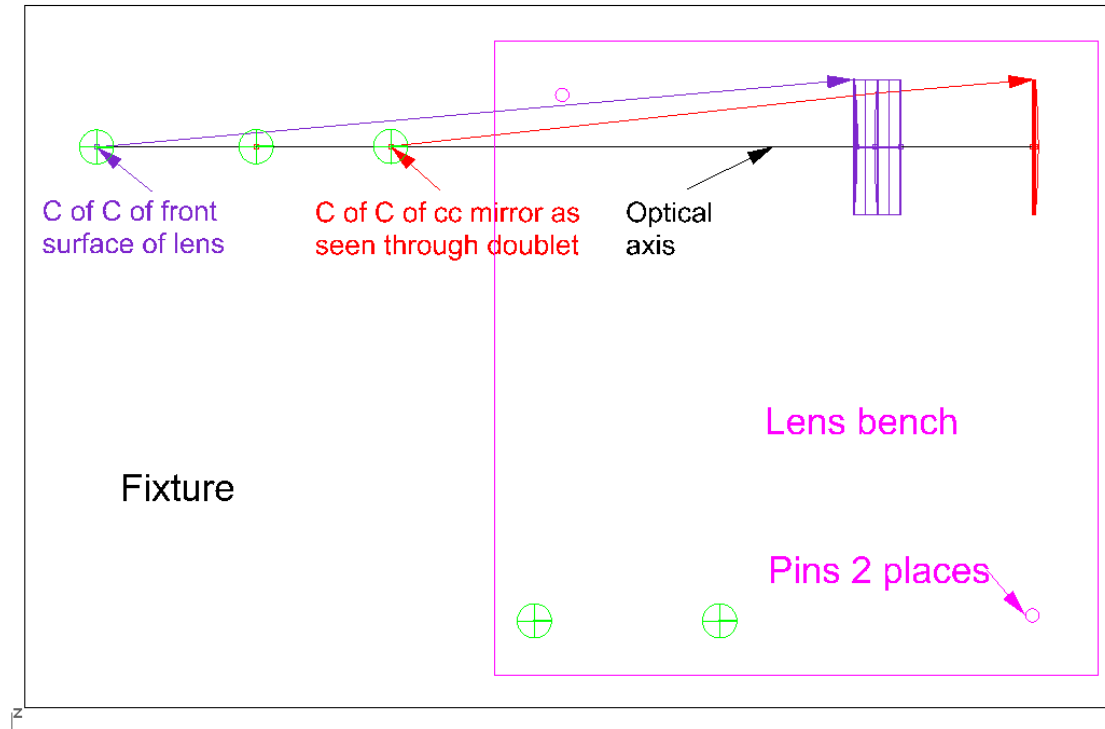
Add balls on posts at object and image center field positions

Add ball at C of C of cc mirror



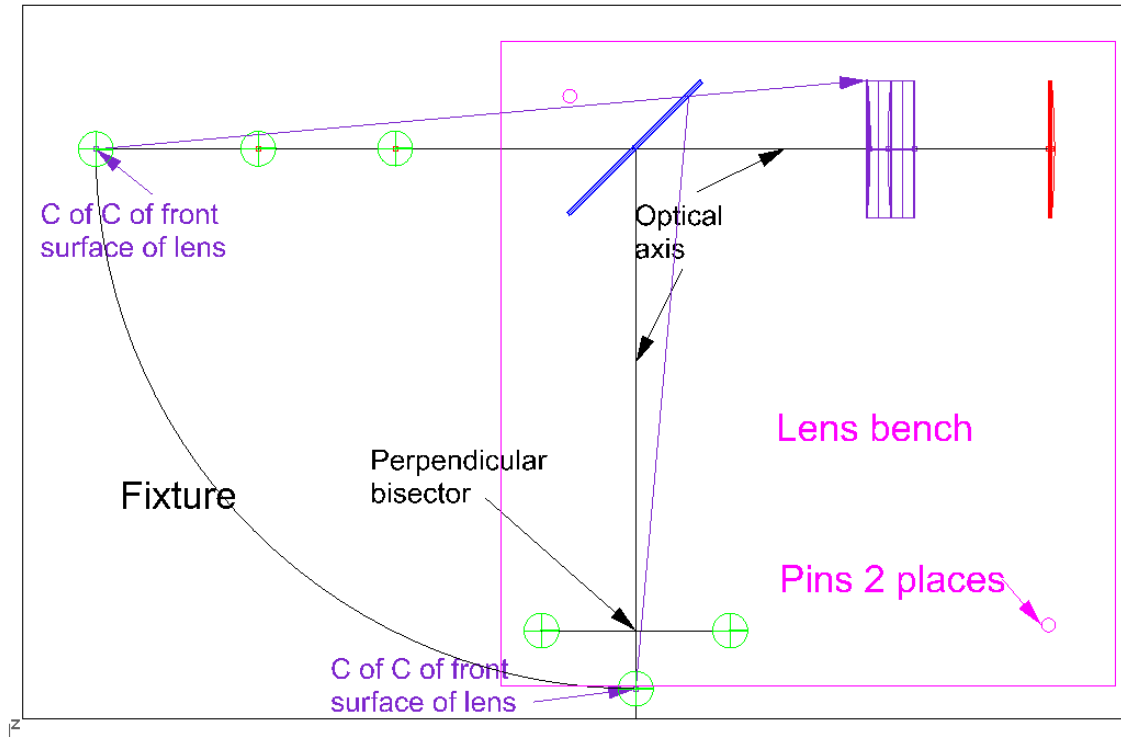
Use 3 D of F on mirror mount to put mirror's C of C at center of ball
Mirror's C of C now on optical axis of system as defined by fixture

Center doublet on axis



Doublet has only one surface that is concave, C of C of front surface
Establish axis (two conjugates) by image of C of C of concave mirror

Add fold mirror on perpendicular bisector of object/image balls

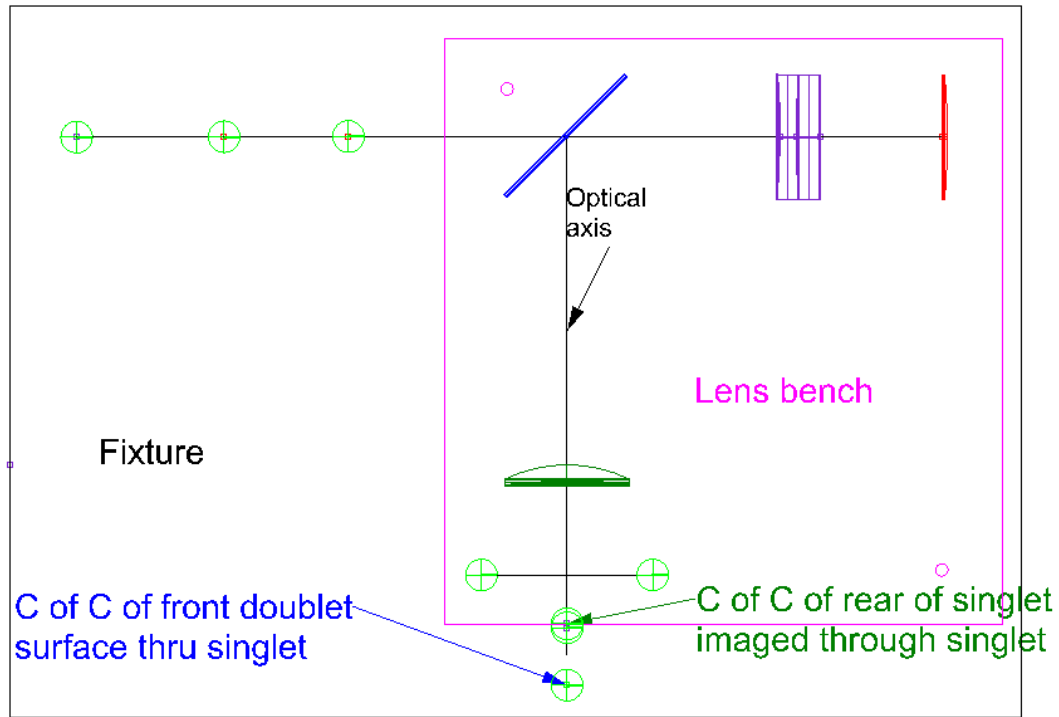


Lower ball defines location of C of C of front surface as folded

Requires 3 degrees of freedom on plane mirror

Plus is check on flatness of plane mirror

Add singlet on folded axis

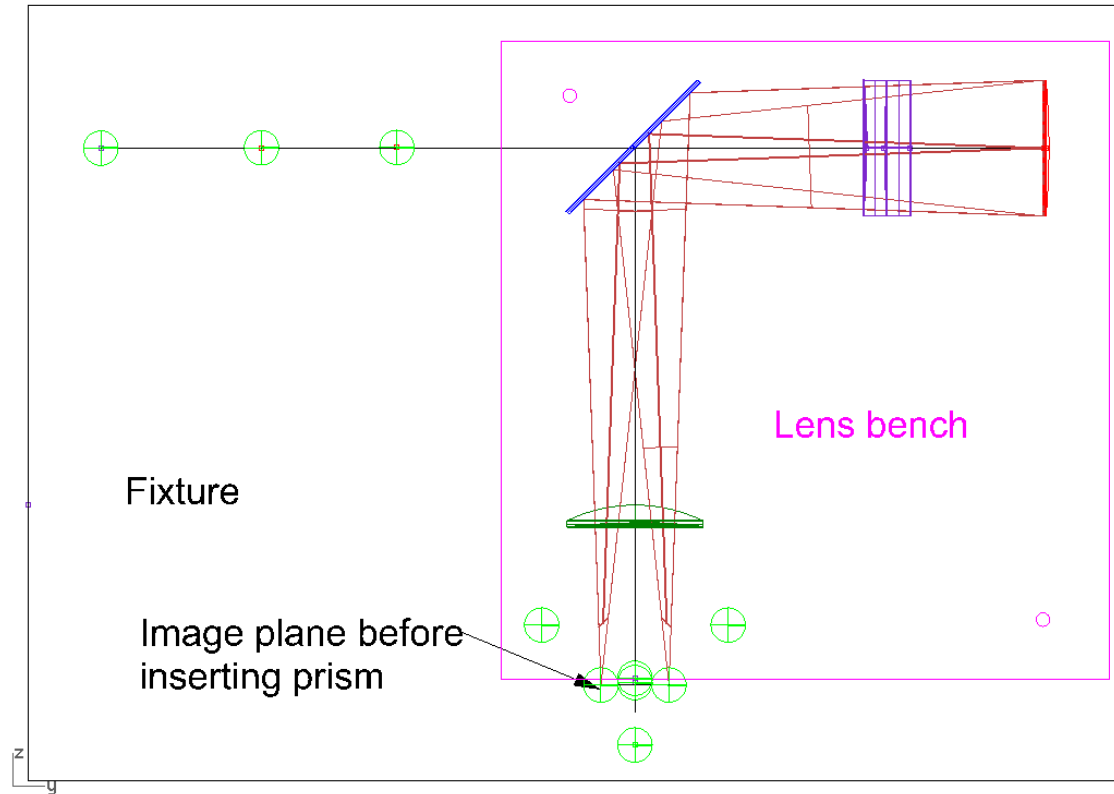


Can see cx side of singlet through the plano side, closer ball

Can see the C of C of the doublet front surface at the farther ball

Two datums establish the axis for the singlet

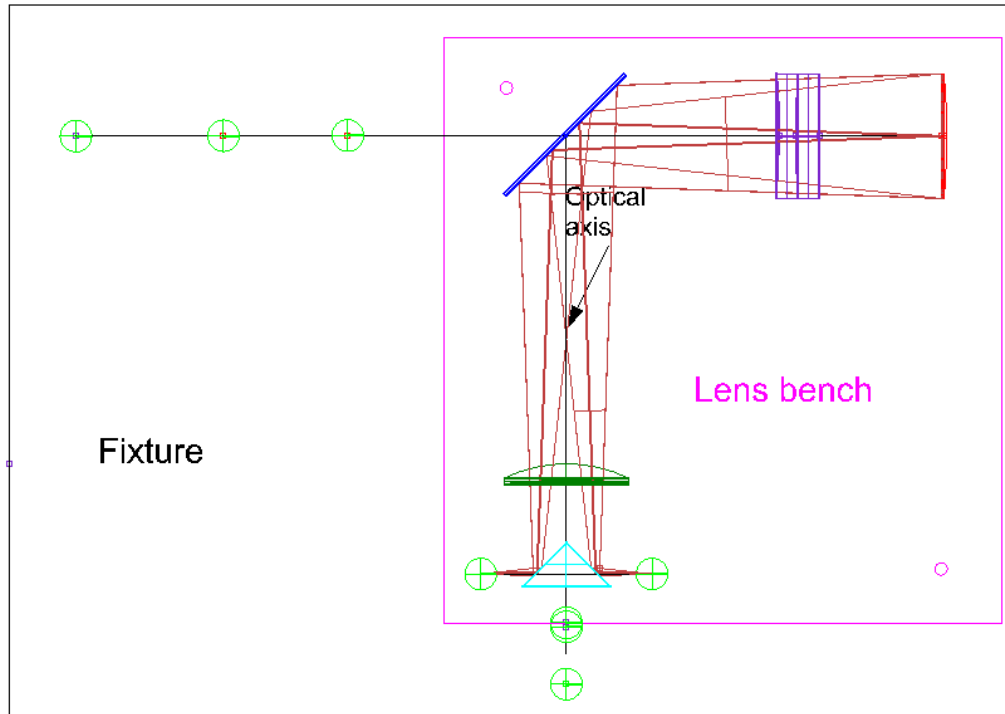
Check system before adding prism



Point source of light at object location returns at image location

Ball at image location reflects light back through system to object

Final step, add prism



Position prism by inputting point of light at object location and reflecting back at image location. Only one correct position