

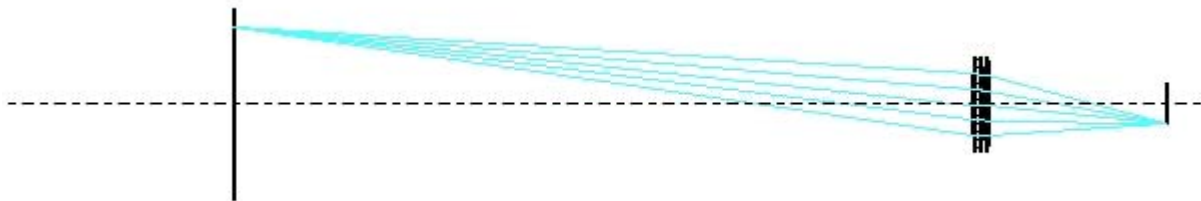
## FL150 as Field Lens or Beam Concentrator

In optical imaging systems, a field lens is an element located at an intermediate image plane, and which therefore plays no part in the focussing or magnification of the system, but which redirects rays so that they remain within the mechanical bounds of the system. In excimer laser projection systems, the term field lens is used for an element placed just before the mask.

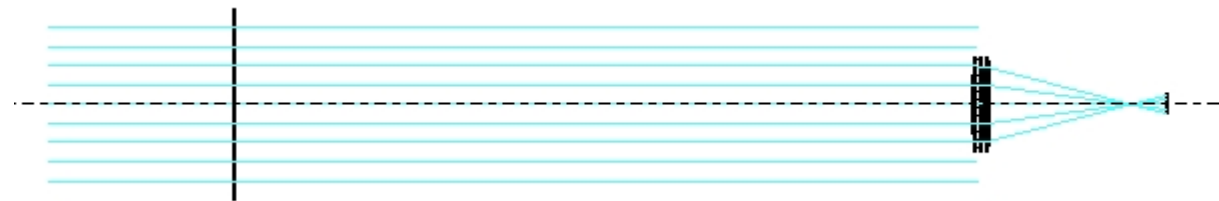
### Object larger than image lens?

In diffuse illumination, one does not need a particularly large aperture lens to photograph a much larger object, - say a mountain, - since rays from all parts of the mountain can enter the lens aperture. A smaller lens aperture just means fewer rays, and hence a dimmer image (with lower resolution and larger DOF). However when the highly collimated radiation from a laser is used to illuminate the mask in a projection system, it is important that rays from all parts of the mask can correctly enter the imaging lens aperture, otherwise parts of the image will be lost altogether.

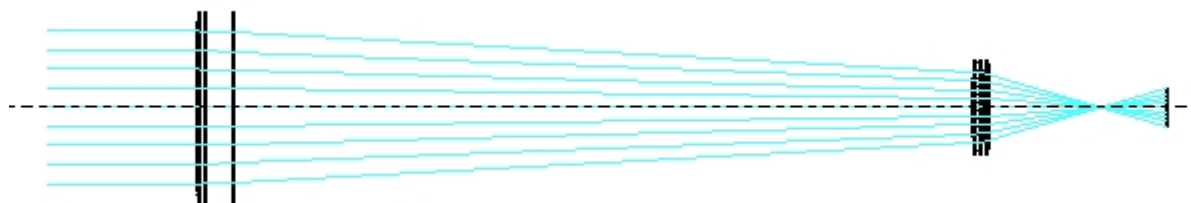
The image lens to the right can form an image of an off-axis point in the mask plane:-



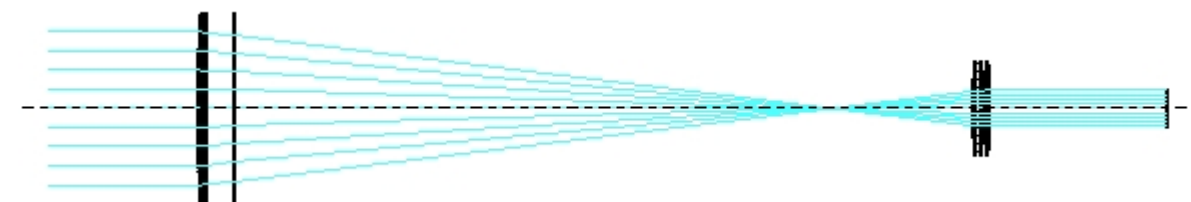
...but not all parallel rays illuminating the mask are able to enter the lens aperture, thus losing parts of the image:-



A field lens corrects this situation:-

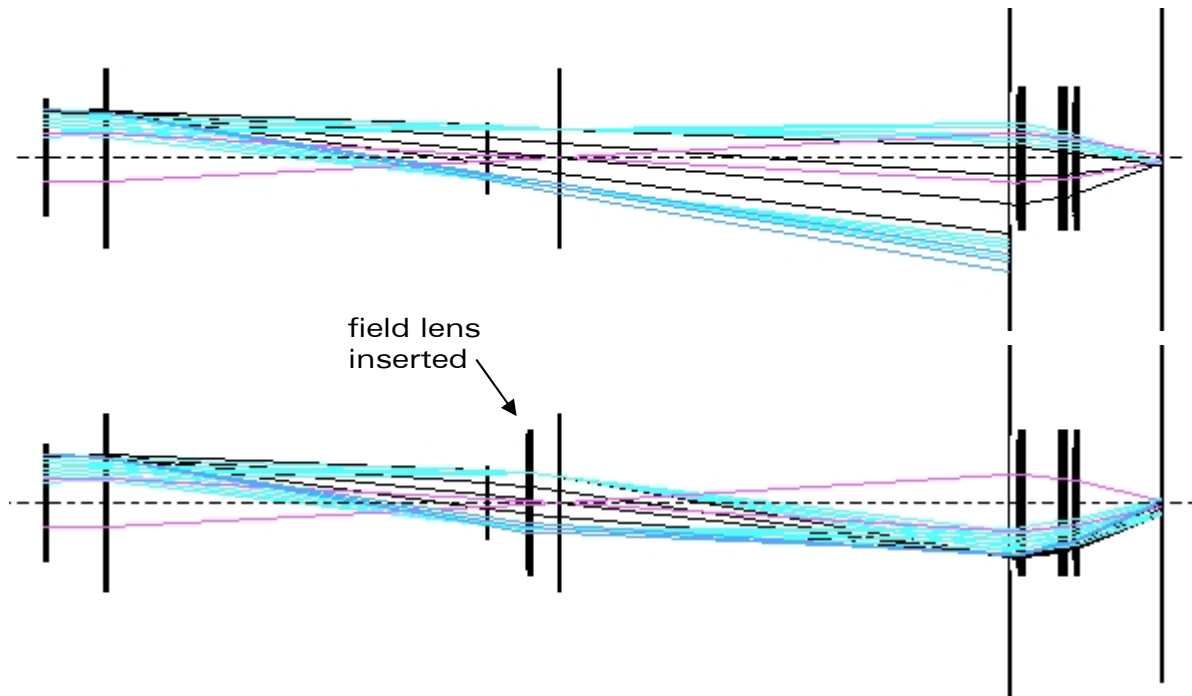


...or can be used to make the imaging system telecentric in image space:-



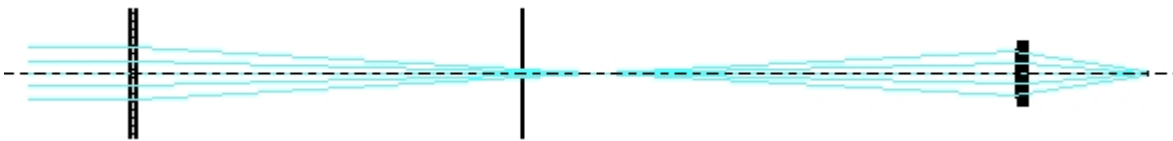
### Matching illumination to lens aperture

When using beam shaping or homogenization optics, some parts of the illumination have a propagation direction inclined to the axis. In the complex example shown overleaf, homogenizing optics are used with a field lens to optimize the beam transport.



### Used as a beam concentrator

To obtain high energy density on the target, a lens can be used as a beam concentrator, forming a beam waist typically downstream of the mask plane.



### FL150

FL150 is a flexible-use variable strength lens which can be used as a modular component in EITHER field lens OR beam concentrator applications, with dioptric power easily set to suit the particular requirement. Useful pupil is 48mm ; position of beam waist 7500-500mm, with scale. AR coatings suit selected excimer wavelength.

