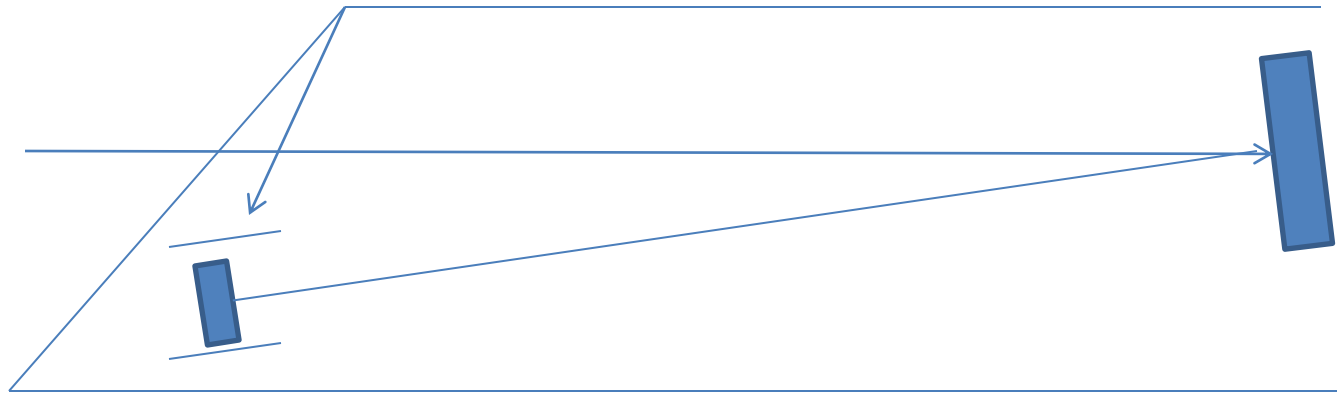


Scattered Light Issues Deployed and Free Flyers

M. Shao

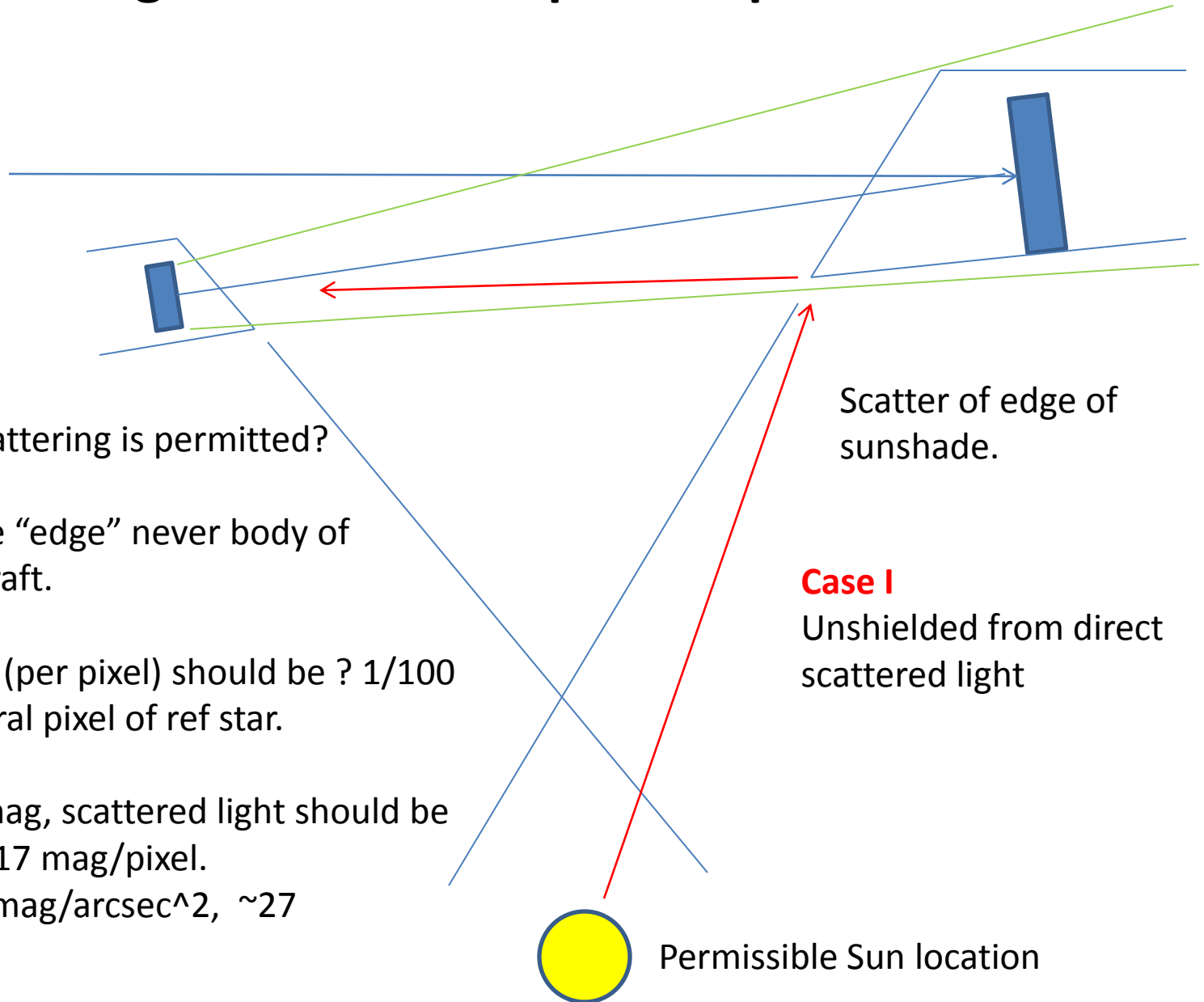
Scattered Light issues for deployed boom



Scattered light (from Sun) is relatively easy to control in a conventional single spacecraft telescope. The same techniques used for HST, Kepler, SIRTf/Spitzer, etc etc.

In a deployed telescope tube, the telescope should be light tight, and the scattered light issues are identical to a normal space telescope.

Scattered Light issues for separate spacecraft



How much scattering is permitted?

CCD's only see "edge" never body of optics spacecraft.

Scattered flux (per pixel) should be ? 1/100 of flux in central pixel of ref star.

Ref star ~12 mag, scattered light should be fainter than ~17 mag/pixel.

Local zodi 22 mag/arcsec², ~27 mag/pixel.

Scatter of edge of sunshade.

Case I
Unshielded from direct scattered light

Permissible Sun location

Numbers, this is a spreadsheet

Sun -26 mag

fraction of sunlight going to 1 pixel = $(\text{scat_area}/1\text{m}^2) * (\text{pix_width}/40\text{m})^2 / (2\pi)$

Geometry

area of scatter 0.000235619 m²

razor edge 100 um

length 2.35619449 m

Distance 40 m

pixel

width 10 um

pix/dist 9.95E-15

Total factor 2.34E-18

in mag 44.08

mag/pix 18.08

Design strategy for FF with direct 1-scatter to CCD.

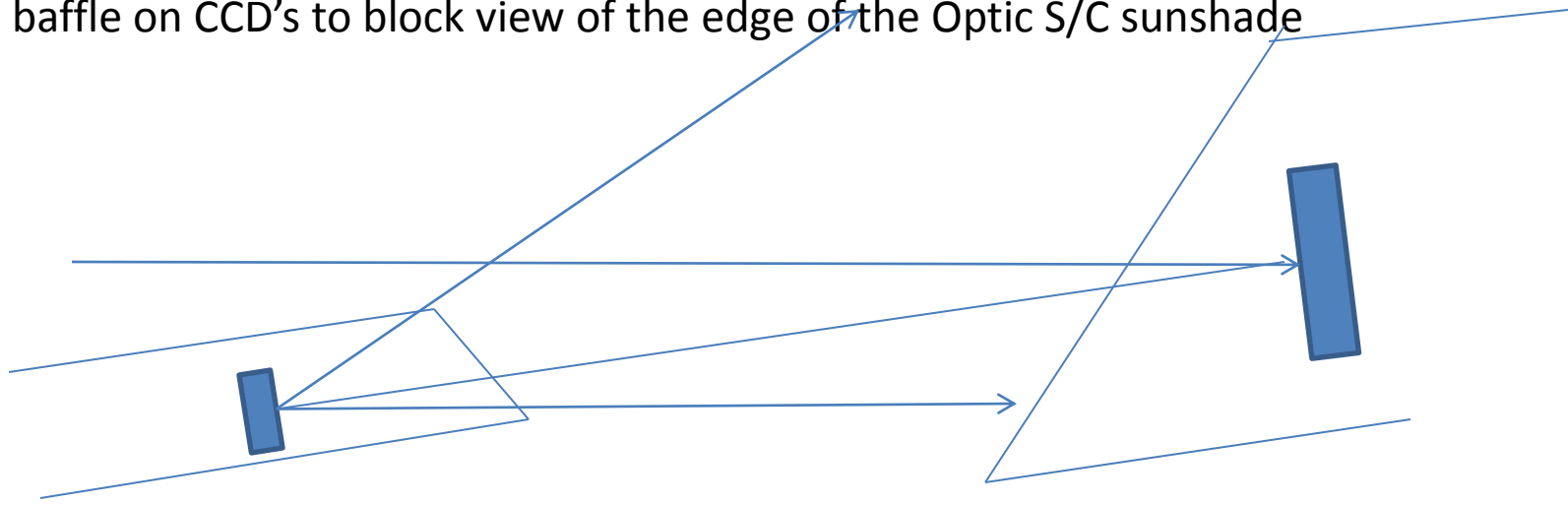
Make scattering area as small as possible

Small diameter sun shade on optic (1.5m dia) slightly larger than optic

Razor's edge (100um) on the sun shade. A real razor, I think has a 25um edge

Edge of razor, Must block the rest of the spacecraft as seen from the CCD.

Case II, baffle on CCD's to block view of the edge of the Optic S/C sunshade



The concept here is to have a tube on the CCD that prevents the CCD From making an image f