Analysis of major baffles: input, primary and detector   Seppala 19Dec2001

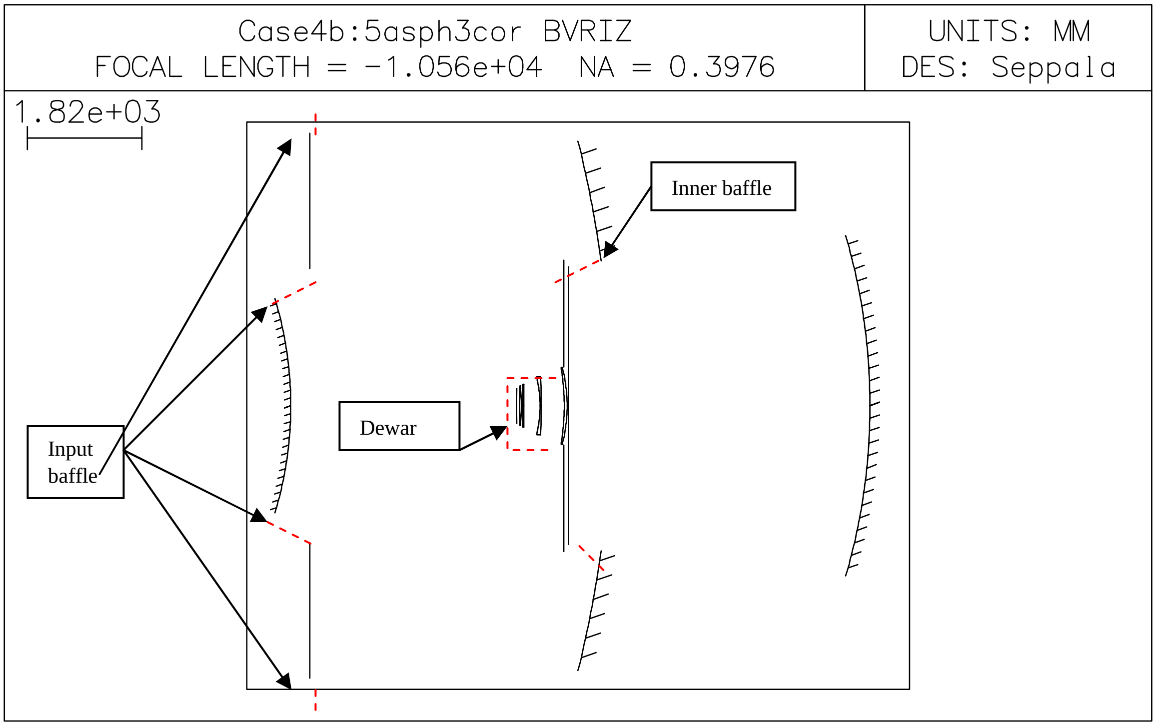

Figure 1. Baffle locations.

I have used three baffles, as suggested in the initial design. The 1st baffle, in conjunction with the primary, defines the input beam. The 1st baffle has two parts. A conical baffle, shown in the red dotted line, extends from the secondary at an angle to just avoid the beam reflected from the primary. The 2nd baffle is located on the primary to vignette the beam reflected from the secondary. This baffle also further limits the amount of light that can directly reach the tertiary. The 3rd baffle is just the obstruction of the detector and dewar.
An advantage of the Case 4b design is that the beam reflected from the secondary is a divergent f/8 beam. Even if there were no baffles, on-axis light that is directly transmitted to the tertiary is focused near the first lens and completely misses the detector. Figure 2 shows on-axis light that should be blocked by the first two baffles.

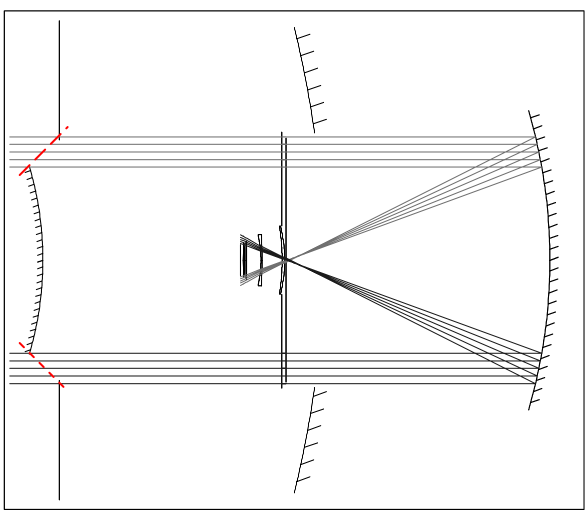

Figure 2. Directly transmitted on-axis light, with no baffles present, misses the detector.

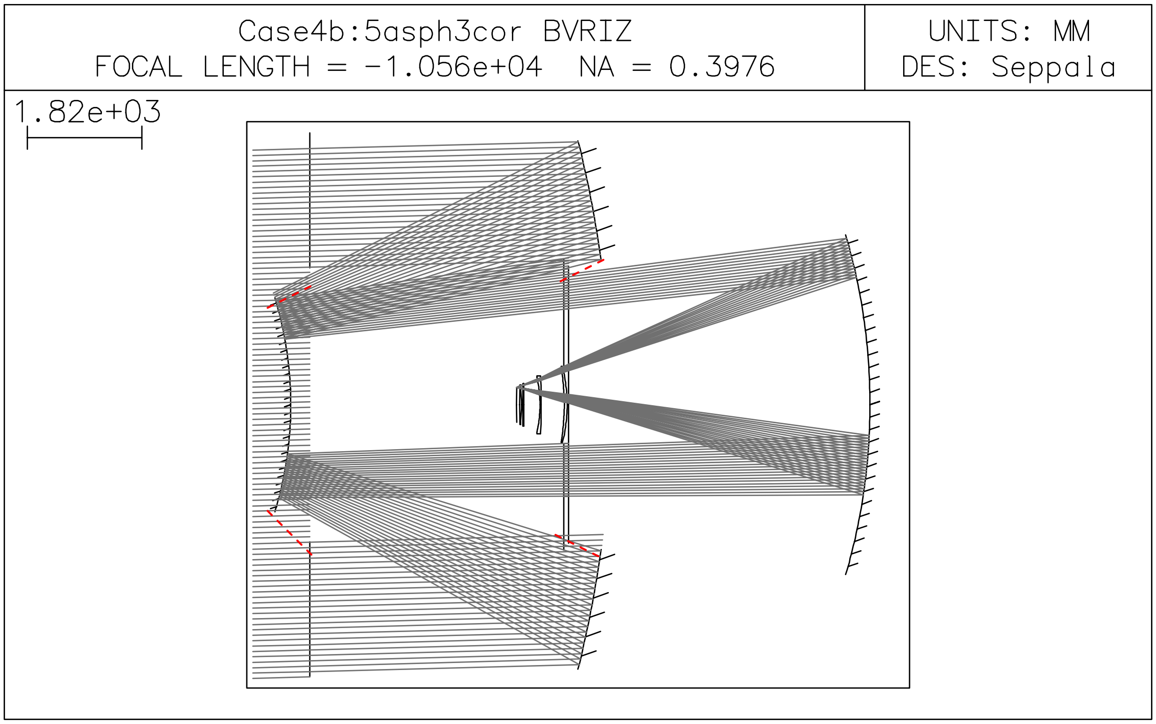

Figure 3. Baffles vignette the full field object point.

Figure 3 shows how the two baffles define the vignetted full field beam.

Figure 4 shows the transmitted light that goes directly to the tertiary for field angles of +/-4.5 degrees, along with an on-axis beam transiting the entire telescope. There is no way to prevent light from reaching the tertiary for large field angles. However, even with multiple reflections in the first lens, no light reaches the detector.

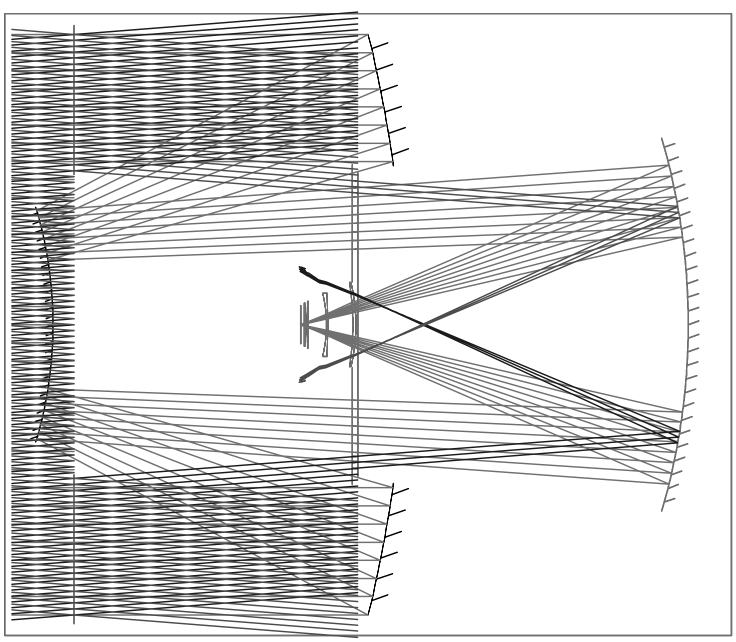

Figure 4. Light that gets through the baffles misses the detector.

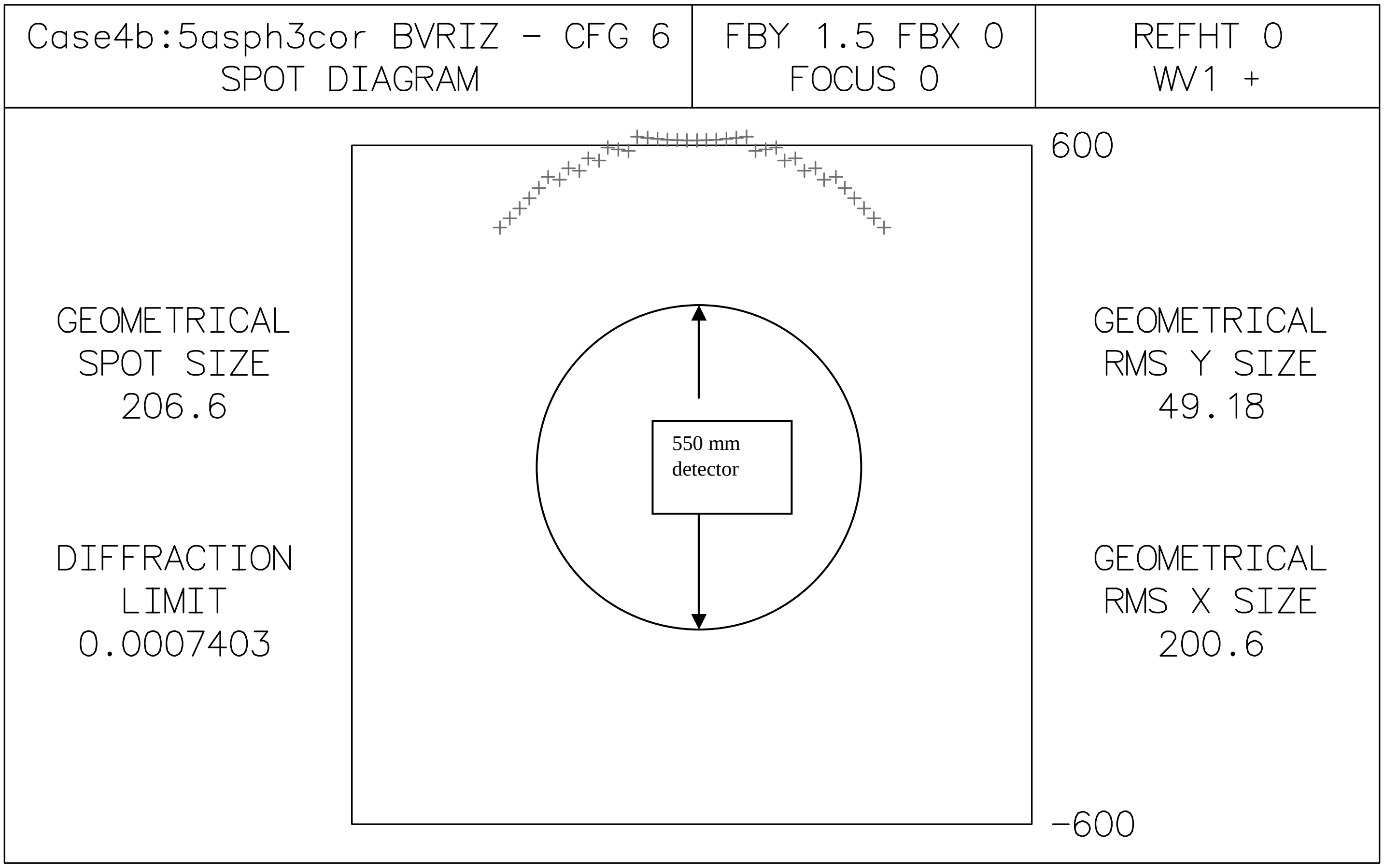

Figure 5. Spot diagram on detector for field angle of 2.25 degrees.

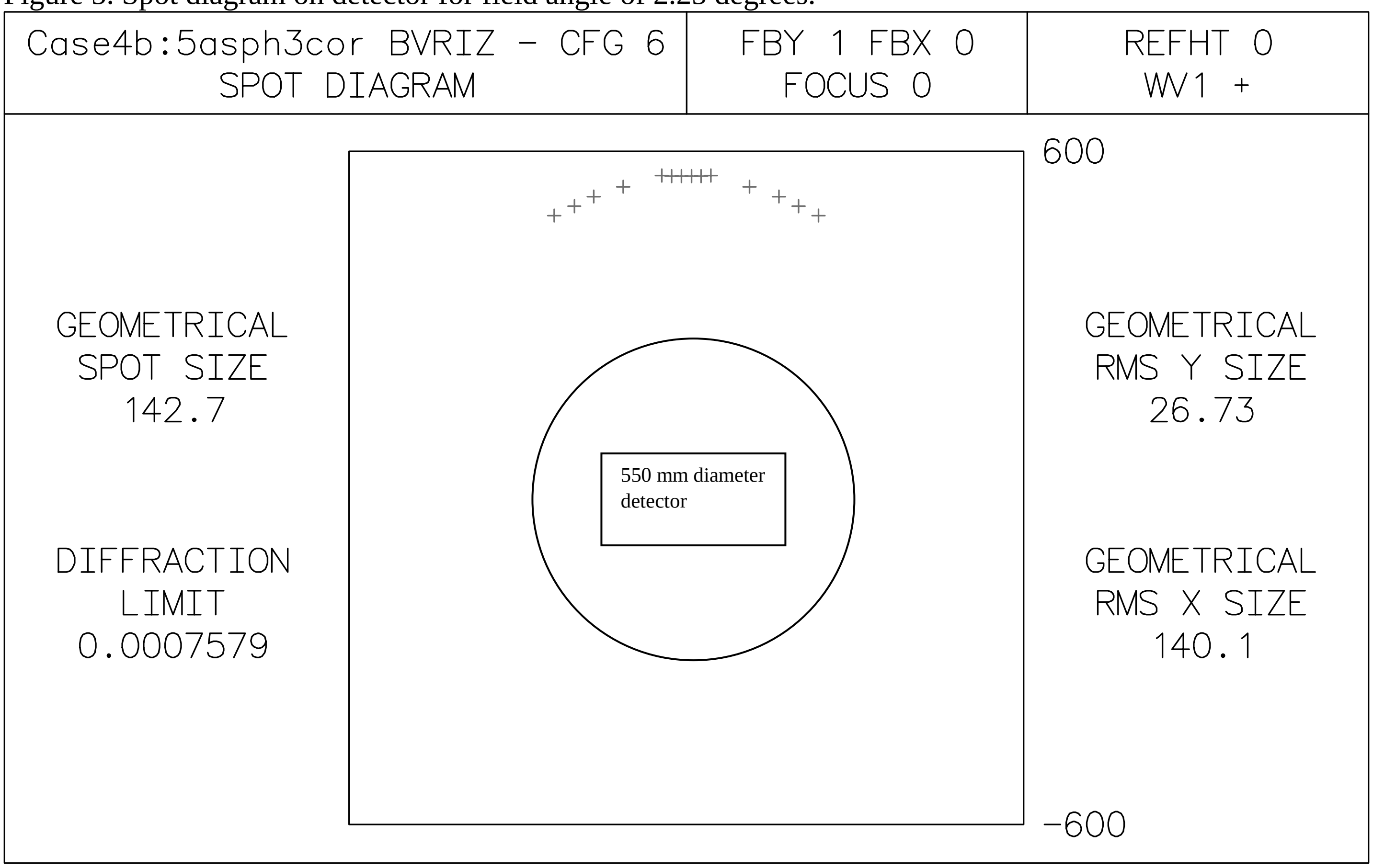

Figure 6. Spot diagram on detector for field angle of 1.5 degrees.