WFMOS PROJECT

90.00.00.01_21.25.00.00_ICD

Version: 4

WFMOS to WFC

ICD

Version:	**4**	**Date:**
Issued by:	Scot Kleinman	29Aug08
Approved by:	**Subaru Manager:**	
	Gemini Manager:	
	Gemini Engineering:	

90.00.00.01_21.25.00.00_ICD, Revision Control

Revision: 1, Scot Kleinman, 9Apr08.

Revision: 2, Scot Kleinman, 15Apr08 – very minor format mods.

Revision: 3, Scot Kleinman, 19Jun08 – new FOV vs. vignetting diagram, 21.25.10.03_DWG. Include space discussion in Section 4 for a possible telecentricity corrector. New Section 5 on the Primary Mirror.

Revision: 4, Scot Kleinman, 26Aug08 – added operating temperature range of WFC.

Contents

1. Introduction

This document describes the WFC and its output beam as delivered to WFMOS, although much of the relevant details are contained in the related reference document, 21.25.10.00_REF. The present document will only include information that is not included in 21.25.10.00_REF.

2. Related Documents

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Document Number	Document Name
21.25.10.00_REF	WFC Optical Characteristics
21.25.10.01_DWG	WFC Non-telecentricity
21.25.10.02_REF	Gillingham report on earlier WFC vignetting
21.25.10.03_DWG	WFC FOV vs. vignetting plot
90.00.00.01_15.10.00.00_ICD	WFMOS to PHSC ICD

3. Canon Design

Document 21.25.10.00_REF describes the optical characteristics of the current Canon WFC design. The design is not yet finalized, but the characteristics described here and in that document can safely be assumed for the CoD study. We do not yet have a ZEMAX model for the corrector, but we expect to receive one around the time of the mid-to-late 2008 Subaru HSC review.

The flat last element shown in the optical layouts contained in 21.25.10.00_REF is a combination of the HSC filter (~20mm thick) and HSC entrance window (~10mm thick). The specifications provided in these documents assume the presence of these two optical elements.

The FOV provided by the corrector is a nominal 1.5 degrees in diameter. The image size is listed as 498mm, which with the ~3.3% distortion at the edges, translates to a 1.5 degree FOV. The un-distorted 1.5 degree FOV would nominally be ~482mm in diameter. The WFC will include an atmospheric dispersion corrector.

The FOV cutoff is not sharp at 1.5 degrees. There is additional FOV available beyond 1.5 degrees, although with increasing vignetting. Figure 1 and drawing 21.25.10.03_DWG plot the output vignetting vs. field size.

The operating temperature range of the WFC is specified as –10 to +10 degrees Celsius.

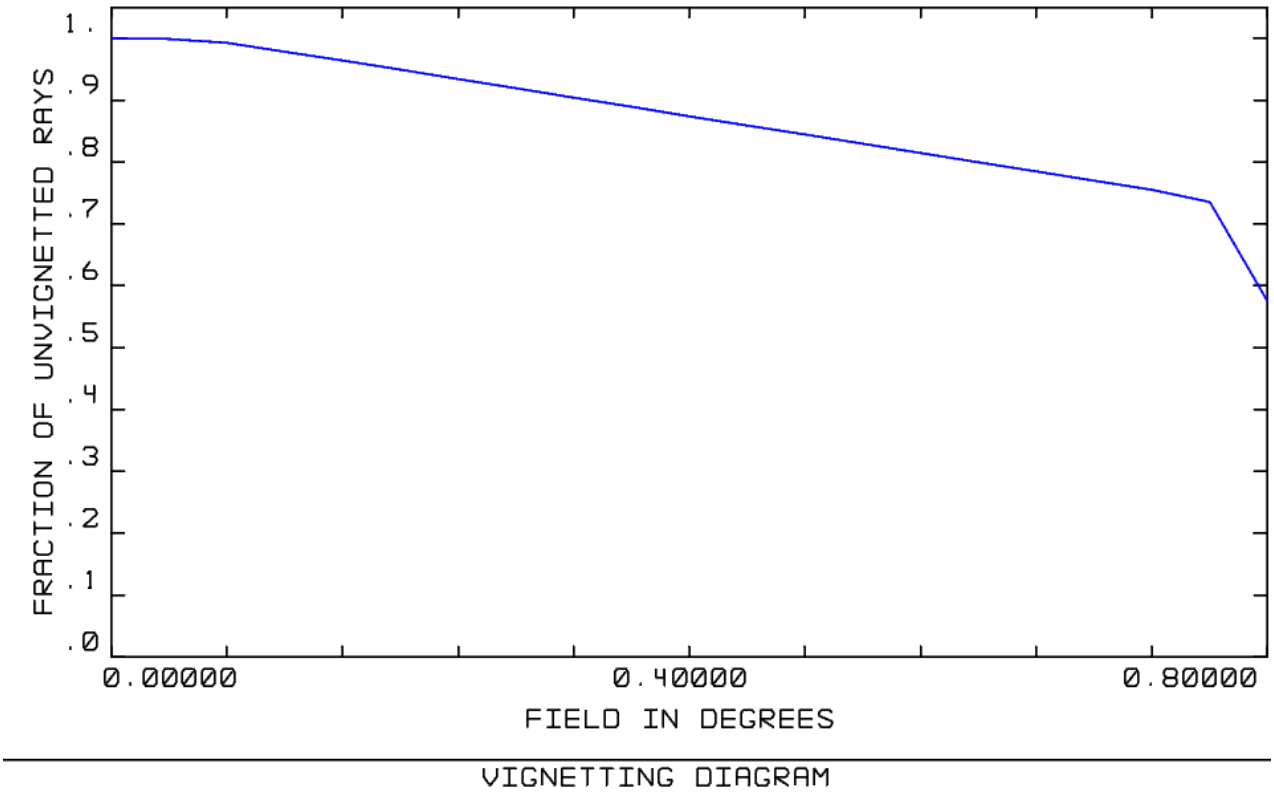

Figure 1: WFC vignetting vs. field size. 21.25.10.03_DWG. See also 21.25.10.00_REF.

4. Non-telecentricity

The field delivered by the WFC is flat, but not telecentric. The beam is telecentric at the center of the FOV, while the central ray of the partially-vignetted ray at the edge of the FOV comes in at an angle of 5.4 degrees. Figure 2 below illustrates the non-telecentricity at the edge of the FOV.

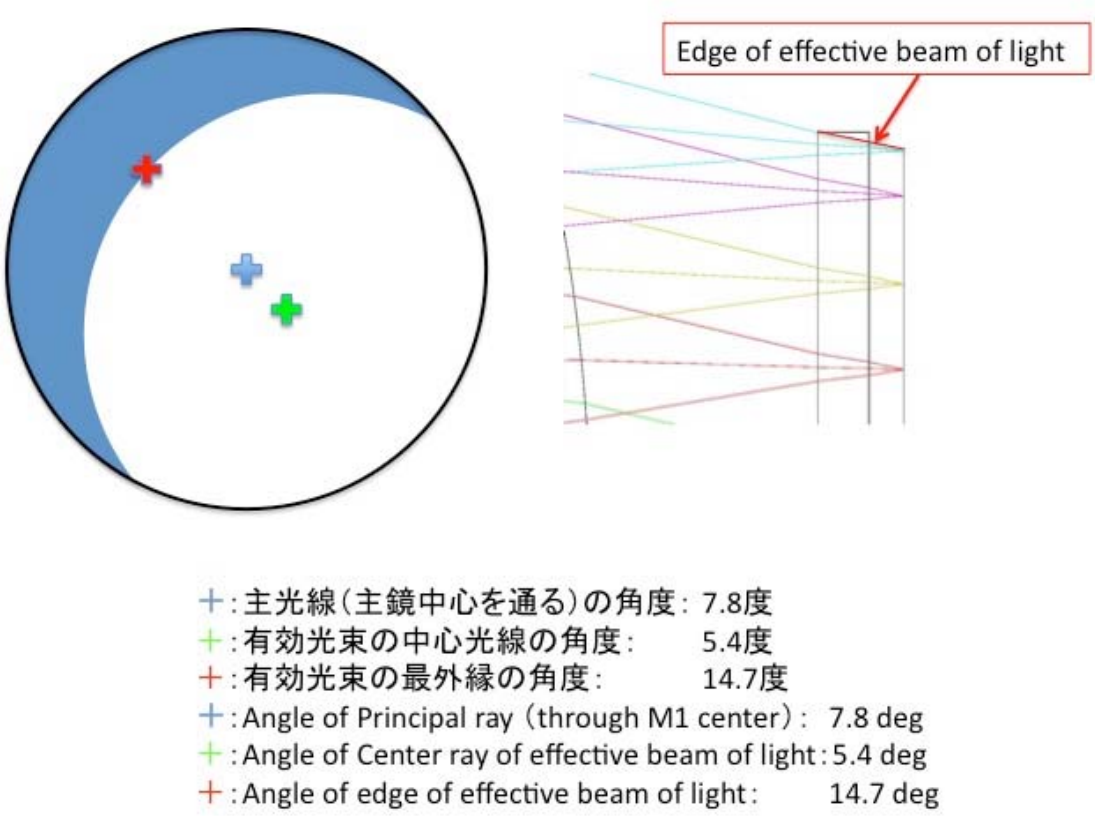

Figure 2: WFC non-telecentricity. From 21.25.10.01_DWG by Yoko Tanaka.

The additional vignetting added by this non-telecentricity is reported in document 21.25.10.00_REF. It was calculated following the procedure used by Peter Gillingham on an earlier WFC design as reported in document 21.25.10.02_REF.

There are 180mm of space between the end of the last lens barrel to the WFC focal plane. The first 30mm of this space, however, cannot be used and exists as a safety margin to prevent damage to the WFC elements. Therefore, there remains 150mm in which additional optics to correct for the non-telecentricity could be inserted.

5. Primary Mirror

The WFC is being designed based on a primary mirror shape with a radius of curvature of 30.000m and a conic constant of –1.00835.