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INSTRUMENT SCIENCE REPORT

FOS - CAL 005

TITLE: FOS -Scattered Red Light (Red Tube)

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ABSTRACT

A quick look analysis was performed on the ambient Scattered Red Light obtained on 22 March 1983. These results are to be presented during the 19 January 1984 FOS/GSFC review.

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The FOS is inherently susceptible to unwanted light since it is a single pass spectrograph employing blazed, concave gratings, and possesses a wide spectral passband of sensitivity.

The laboratory data to be discussed here were obtained by placing several different (red-pass) absorbing filters in front of the (Tungsten) continuum source. The resulting absorption region was observed to measure the stray light contribution. This method is particularly relevant as it mimicks the observation of late type stars, which have rather steep cut-offs in their energy distribution in the ultraviolet.

The filters used were spare flight (Schott) units, designated OG530, GG395\*, WG295 and WG230. Their approximate transmission curves are shown as Figure 1.

The actual observed countrates (through aperture C3) are shown as Figure 2. For each filter, four different gratings (H19, H27, H40 & H57) were observed. The necessary paired-pulse corrections for countrates in excess of app. 20000 c/s are indicated with broken lines.

Of particular relevance are the observed counts using the H19 grating (1550-2350 A). The four curves shown in that wavelength region correspond to each of the four filters used and the countrates increase from roughly 2 c/s for OG530 to about 8 c/s for WG230. This is easily understood as the consequence of the increase in bandwidth of the incoming flux from the Tungsten lamp. Note that although the Figure 2 is labelled in Angstrom, the measured counts are obviously from ("scattered") optical and near ultraviolet photons.

The effective bandwidth of the incoming light is limited at the long wavelength side by the cut-off of the photocathode of the (Red) tube which occurs at app. 7000 Å. On the blue side, the observed values for the cut-off are app. 4800\*\*, 3750, 2850 & 2300 Å, for OG530, GG395, WG295 and WG230, respectively. Note that although the increase of bandwidth in going from OG530 to GG375 is rather modest in an absolute sense, the observed amount of scattered light (in H19) more than doubles. This is probably due to the increase of scattering efficiency for decreasing wavelength (e.g. Rayleigh scattering  $\propto \lambda^{-4}$ ) and suggests that most of the photons counted in H19 through the OG530 filter have probably wavelengths of around 5500Å, rather than the larger values present in the incoming flux.

The observed curves of Figure 2 are thus generally well understood, at least in a qualitative sense. Exception should be made for the unidentified feature around 3550Å (H40-grating). The width of this feature is app. 150Å and exhibits a central "inversion". The observational data in this wavelength region are attached as Figure 3.

\*There is some confusion with respect to this filter. The FOS Scientists Notebook calls this filter GG395, whereas Harms et al. in NASA CP-2244 quote GG375.

\*\*This observed cut-off is somewhat surprising as the Schott-catalog (see Figure 1) claims that the transmission in this filter should be down to  $10^{-5}$  at 5000Å.

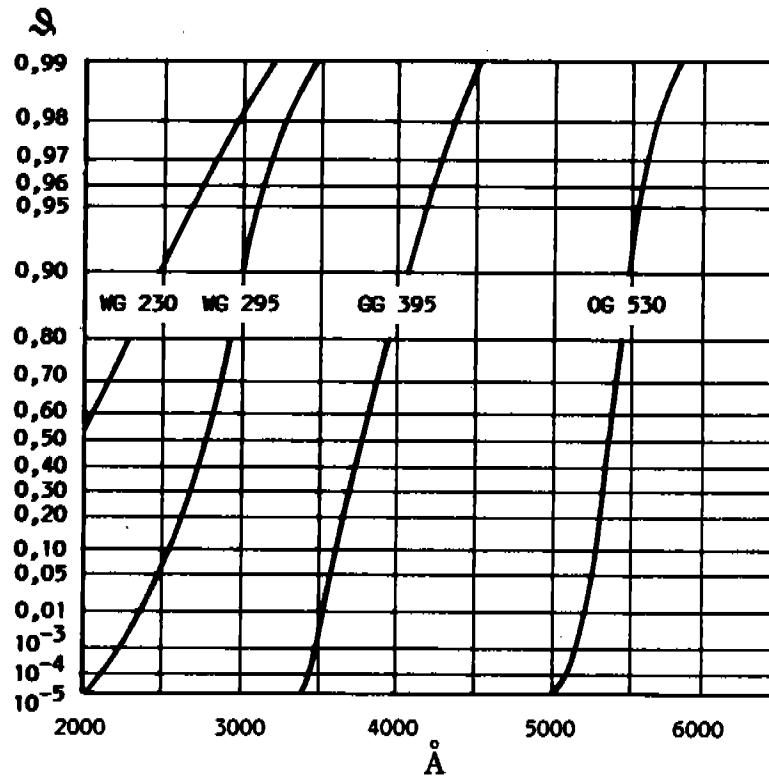


FIGURE 1

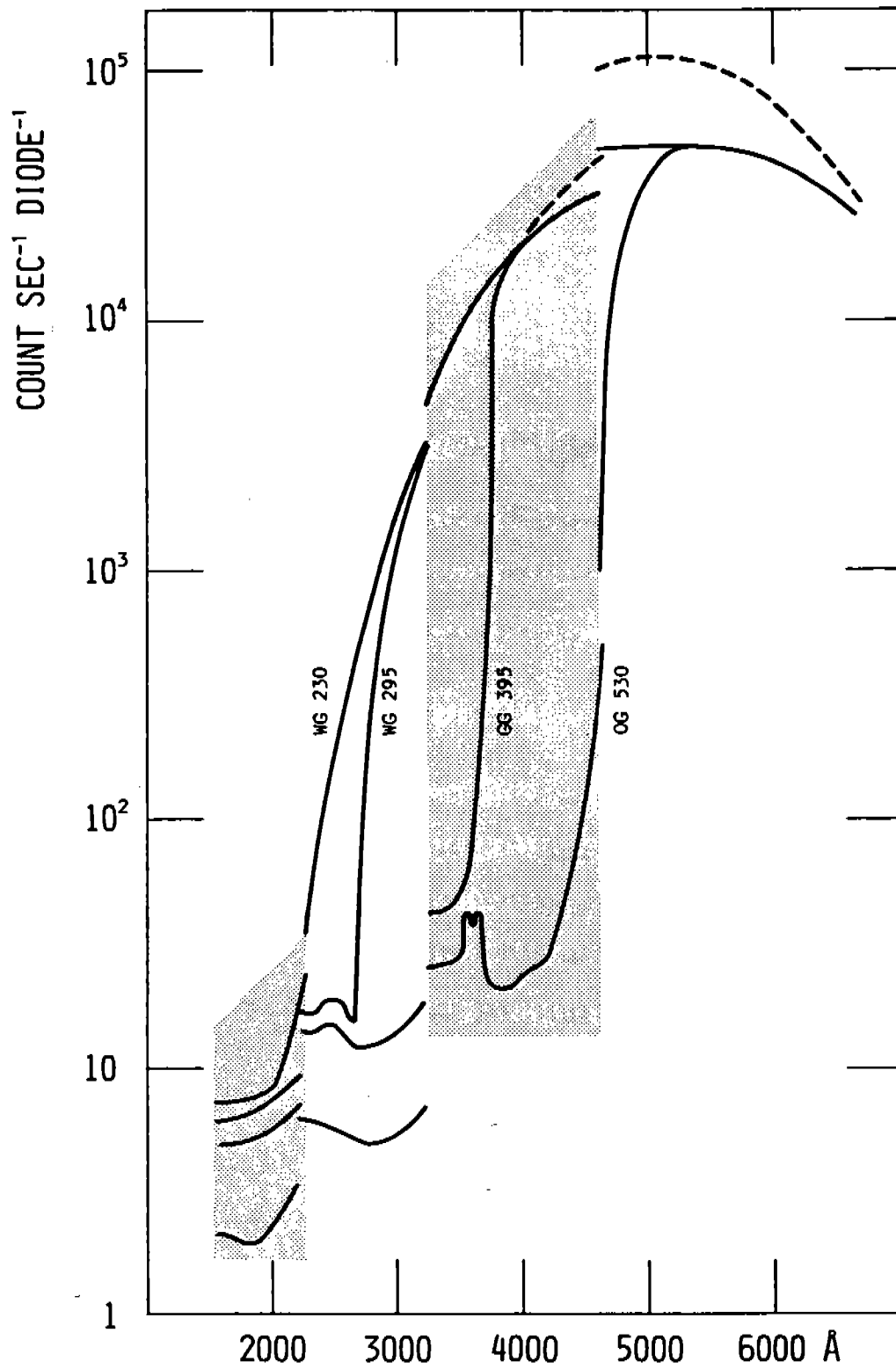


FIGURE 2

DAT 22-MAR-83 HTM 07:26:41 MIF= 3 MAF= 0 BSV-2982 BSI= 285 PSS= 11  
 EHT-H00081 SDT-H00096 SDF=1 PWD=OK HJC=OPFU PRS=AMB TMP=ROOM SID=A  
 CMT 12:-SCAT-RED-LIGHT-ON-RED-SIDE OPR BI/STREI  
 SNC= 165 WPL= 516 LPF= 5 PLZ=CW01 ENT= 1 FGW=H40 APR= C3 TAX= 0  
 HOV= 2 LOU= 4826 HVD=18359 ARQ= 3 FOC=208 SAF= 0 INM= 8 TAY= 0  
 XDC= 66 X-P= 1536 X-B= 0 X-S= 4 REF= 71 SLI= 1 MUL= 5 TMX= 1536  
 YDC= 541 Y-P= 2048 Y-B= -736 Y-S= 1 Y-R= 32 CH1= 0 #CH=512 DE1= 20  
 LIU= 200 DED= 10 NLM=65535 ACM= 8 INT= 1 PTN= 10 RDO= 1 DE2= 12  
 RAW CNTS, YMIN=0.000, YMAX=1000.0, INTSIZ=100.0  
 ADMIN=260, DMAX=355, DAUG=317, ERRCNT= 0, ENAB=500, RAMMAP=0,1,2,3,4,5,6,7

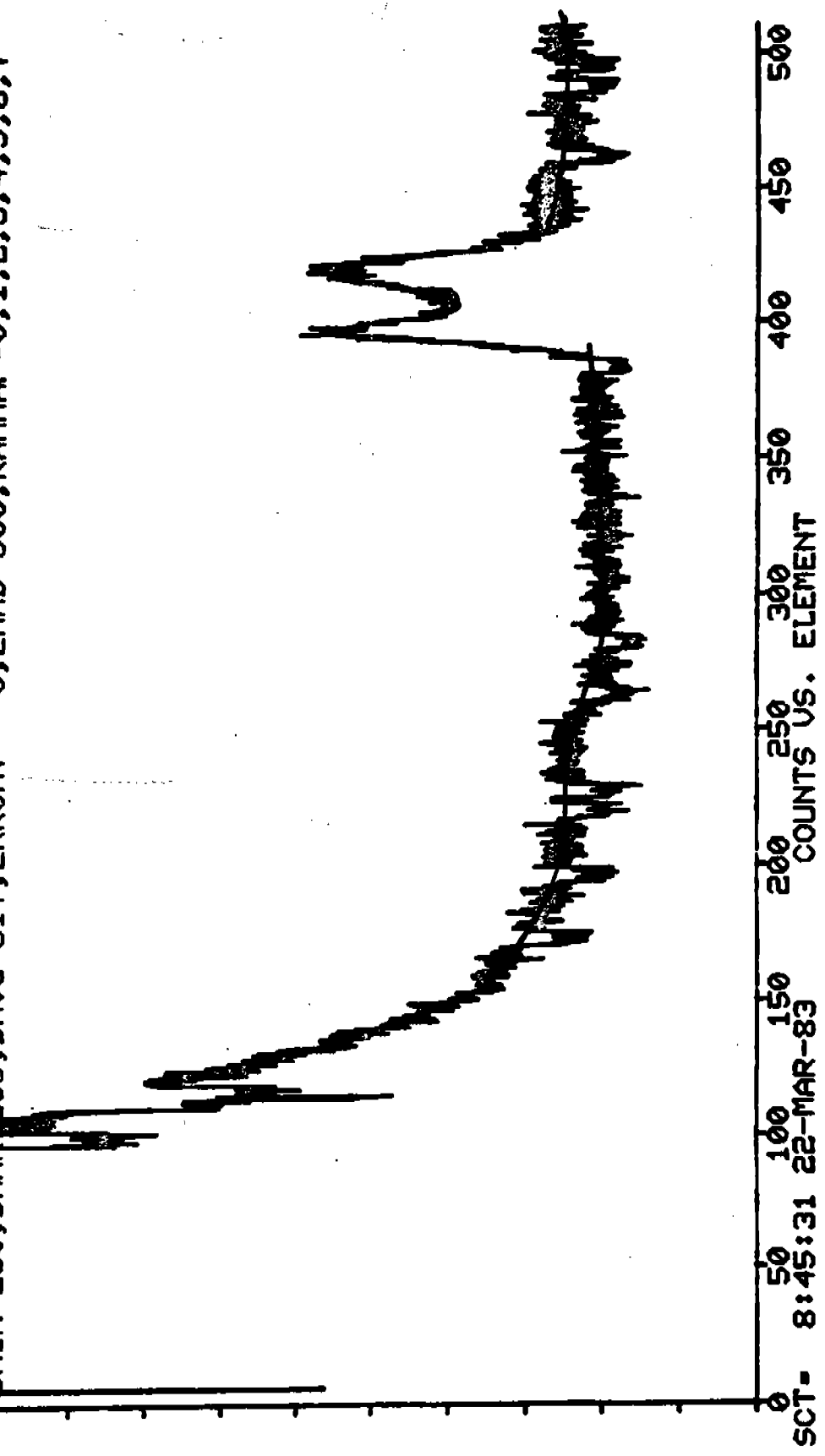


FIGURE 3