STIS Spectroscopic Modes

Grating/ Prism	Detector	Wavelength Range (Å) Full	per tilt	Resolving Power (l/Dl)
First Order Gratings				
G140L	FUV-MAMA	1150-1730	580	934-1440
G140M		1150-1740	55	11,500-17,400
G230L	NUV-MAMA	1570-3180	1610	500-1005
G230M		1640-3099	90	9100-17,500
G230LB	CCD	1685-3175	1380	615-1135
G230MB		1640-3190	155	5550-10,335
G430L		2900-5700	2800	530-1040
G430M		3025-5615	286	5330-10,270
G750L		5240-10270	5030	535-1170
G750M		5450-10200	570	4870-9950
Echelle Gratings				
E140M	FUV-MAMA	1150-1700	550	45,800
E140H		1150-1700	210	114,000[1]
E230M	NUV-MAMA	1575-3100	800	30,000
E230H		1650-3000	267	114,000[1]
PRISM				
PRISM	NUV-MAMA	1150-3000	1950	2500 - 10

[1]Resolution of up to 200,000 may be obtained when using the 0.1X0.03 aperture and special data processing.

Fixing STIS Slit Angle on the Sky

The STIS long slit is approximately aligned with the detector's AXIS2, i.e., it is perpendicular to the dispersion axis (AXIS1). If you want the long slit to be oriented at a position angle θ on the sky, where θ is measured in degrees east of north, then the ORIENT special requirement parameter in your Phase 2 APT file should be set to θ+45 or θ+225 degrees.

STIS CCD Imaging Filters

Filter Name	Filter Description	Central Wavelength (Å)	FWHM (Å)	FOV (arcsec)^2
50CCD	unfiltered CCD	5754	4333	52 x 52
F28X50LP	longpass > 5500 Å	7222	2692	28 x 52
F28X50OII	[O II]	3738	57	28 x 52
F28X50OIII	[O III]	5006*	6.2*	28 x 52
F25ND3	ND = 2 x 10^{-3}	6331	4675	25 x 25
F25ND5	ND = 10^{-5}	7022	4704	25 x 25

*Value excludes contribution of red leak

Supported STIS Apertures

Aperture	Peakup	Throughput	Comment
Supported Long Slits for First Order Gratings			
52X0.05	yes	21-51%	2 pixel resolution with MAMA
52X0.1	yes	33-75%	2 pixel resolution with the CCD
52X0.2	no	40-87%	Good throughput and spectral purity
52X0.5	no	49-93%	Good point source spectrophotometry
52X2	no	57-99%	Best point source spectrophotometry
52X0.2F1	no	42-87%	Places source behind occulting bar
Supported Apertures for Echelle Gratings			
0.2X0.06	yes	23-59%	2 pixel resolution for E140M, E230M
0.2X0.09	yes	27-69%	2 pixel resolution for E140M, E230M
0.2X0.2	no	34-83%	Good throughput and spectral purity.
6X0.2	no	50-85%	For emission lines; order overlap.
0.1X0.03	2-stage	13-36%	Best spectral resolution
0.2X0.06FP	yes	25-64%	Mitigate fixed pattern noise
0.2X0.2FP	no	34-83%	Mitigate fixed pattern noise
0.2X0.05ND	yes	0.13-0.63%	For bright sources
0.3X0.05ND	yes	0.02-0.07%	For bright sources

Note: Appending E1 to the 52X* aperture names above positions the target closer to the readout of the CCD, allowing for reduced CTI losses.

STIS FUV Imaging Filters

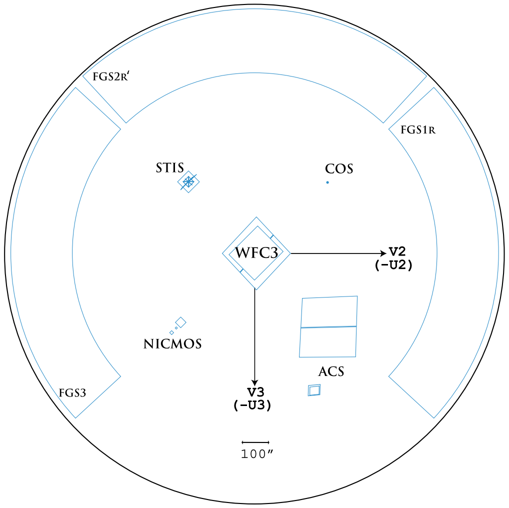
Filter Name	Filter Description	Central Wavelength (Å)	FWHM (Å)	FOV (arcsec)^2
25MAMA	clear	1369	318	25 x 25
F25LYA	Lyman a	1242	142	25 x 25
F25SRF2	longpass > 1275 Å	1453	282	25 x 25
F25QTZ	longpass > 1475 Å	1595	229	25 x 25
F25ND3	ND = 10^{-3}	1371	311	25 x 25
F25ND5	ND = 7 x 10^{-7}	1380	328	25 x 25
F25NDQ	Quad ND filter 10^{-1},10^{-2},10^{-3},10^{-4}	varies	varies	~12 x 12 each

STIS NUV Imaging Filters

Filter Name	Filter Description	Central Wavelength (Å)	FWHM (Å)	FOV (arcsec)^2
F25SRF2	longpass > 1275 Å	2306	1134	25 x 25
F25QTZ	longpass > 1475 Å	2361	995	25 x 25
F25CN182	1800 Å continuum	2007	677	25 x 25
F25CIII	C III narrow band	1991*	166*	25 x 25
F25CN270	2700 Å continuum	2723	288	25 x 25
F25MGII	MG II narrow band	2807*	50*	25 x 25
F25ND3	ND = 10^{-3}	2361	1310	25 x 25
F25ND5	ND = 2 x 10^{-6}	2634	1471	25 x 25
F25NDQ	Quad ND filter 10^{-1},10^{-2},10^{-3},10^{-4}	varies	varies	~12 x 12 each

*Values exclude contributions from red leak.

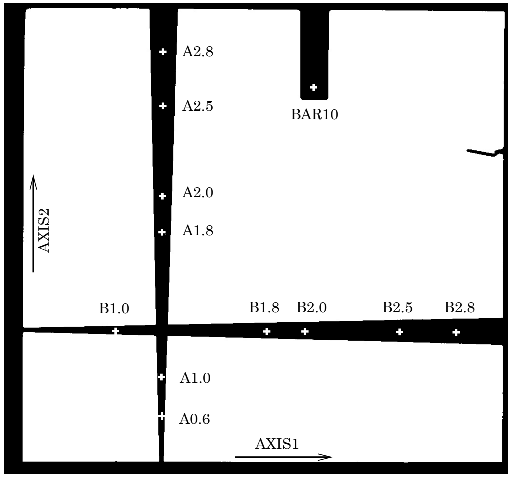
HST Field of View



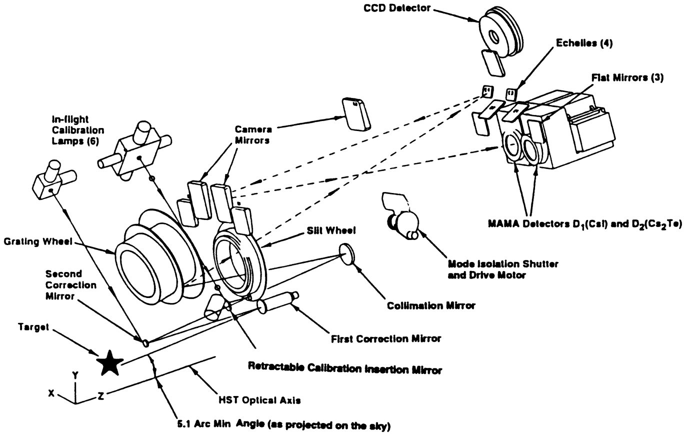
STIS Coronography

Each of the 52" STIS apertures has two occulting bars. Appending F1 or F2 to the aperture name will position the target at the 0.5" or 0.86" wide bars. Only the 52X0.2F1 position is fully supported.

STIS has a single coronagraphic mask aperture for direct unfiltered CCD imaging. This aperture contains one occulting bar and two wedges that vary in width from 0.5 to 3.0 arcsec over their 50 arcsec length.



STIS Optical Components



STIS History

STIS was installed in HST on February 14, 1997. The Side-1 electronics failed on May 16, 2001, but STIS continued operations using the redundant Side-2 electronics until August 3, 2004, when a power supply on Side-2 failed and rendered STIS unusable for scientific operations.

In May 2009, during SM4, astronauts Michael Good and Mike Massimino successfully repaired STIS by replacing the failed circuit board, fully restoring STIS to operation. The post-repair capabilities of STIS in 2009 are very similar to its capabilities in 2004.

STIS provides scientists with spectra and images at ultraviolet and visible wavelengths, probing the Universe from our solar system out to cosmological distances. The UV echelles allow observations with very high spectral resolution, while the first order spectral modes combined with long slits allow very high spatial resolution observations of extended objects at wavelengths ranging from the far-UV to the near-IR.

The unique capabilities of a repaired STIS should ensure that it will carry out a very substantial part of the HST observing program in the years to come.

STIS

Space Telescope Imaging Spectrograph

FUV MAMA

- 1024 × 1024 cesium iodide detector
- Sensitive from 1150 to 1700 Å
- 25″ × 25″ field of view with 0.025″ pixels
- first order and echelle gratings plus imaging filters

NUV MAMA

- 1024 × 1024 cesium telluride detector
- Sensitive from 1650 to 3100 Å
- 25″ × 25″ field of view with 0.025″ pixels
- first order and echelle gratings and imaging filters

CCD

- 1024 × 1024 SITE CCD detector
- Sensitive from 1640 to 10,740 Å
- 52″× 52″ field of view with 0.051″ pixels
- Can be used with coronographic mask and aperture bars

Coronagraphy

- Coronagraphic imaging from 2000–10,300 Å
- Bar-occulted spectroscopy from 1150-10,300 Å

The Space Telescope Imaging Spectrograph was built through a collaborative effort between Ball Aerospace & Goddard Space Flight Center. STIS was installed on the Hubble Space Telescope (HST) during servicing mission SM2 in 1997 and operated until 2004. STIS was restored to operations in May 2010 after being repaired during SM4.

The STIS principal investigator is Bruce Woodgate (GSFC).

For further HST information visit:

http://www.stsci.edu/hst

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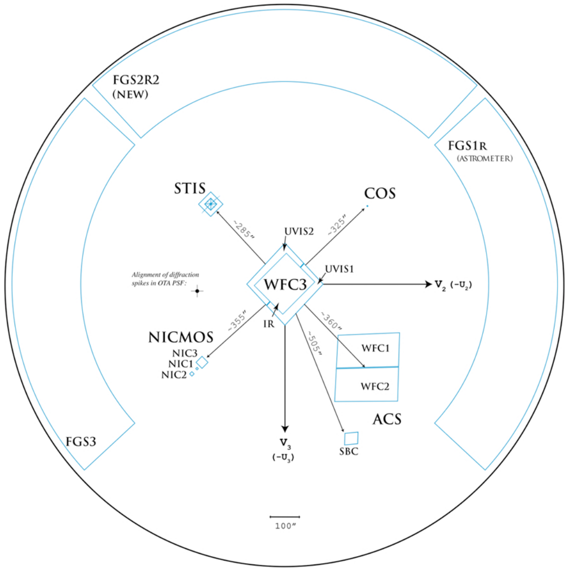
January 2010

Table 4.1: STIS Spectroscopic Capabilities

Grating	Spectral Range (Å) Complete	Spectral Range (Å) Per Tilt	Spectral Resolution Scale Δλ (Å per pixel)	Spectral Resolution Resolving Power (λ/2Δλ)	No. Prime Tilts[a]	Detector	Recommended Slits (apertures)[b,c,d,e,f,g,h,i]	Refer To Spec. Ref. Material Chapter 13 Page #
MAMA First-Order Spectroscopy								
G140L	1150–1730	610	0.60	960–1440	1	FUV-MAMA	52X0.05D1,52X0.1D1 52X0.2D1,52X0.5D1 52X2D1,25MAMAD1 F25SRF2D1,F25QTZD1	298
G140M	1140–1741	55	0.05	11,400–17,400	12	FUV-MAMA		301
G230L	1570–3180	1610	1.58	500–1010	1	NUV-MAMA		292
G230M	1640–3100	90	0.09	9110–17,220	18	NUV-MAMA	52X0.05 52X0.1 52X0.2 52X0.5 52X2 52X0.2F1 0.2X0.2	295
CCD First-Order Spectroscopy								
G230LB	1680–3060	1380	1.35	620–1130	1	CCD	52X0.05E1 52X0.1E1 52X0.2E1 52X0.5E1 52X2E1	284
G230MB	1640–3190	155	0.15	5470–10,630	11	CCD		288
G430L	2900–5700	2800	2.73	530–1040	1	CCD		278
G430M	3020–5610	286	0.28	5390–10,020	10	CCD		281
G750L	5240-10,270	5030	4.92	530-1040	1	CCD	52X0.2E2 52X0.5E2 52X2E2	272
G750M	5450-10,140	570	0.56	4870-9050	9	CCD		275
MAMA Echelle Spectroscopy								
E140M	1144–1729	585	λ/91,700	45,800	1	FUV-MAMA	0.2X0.2, 0.2X0.06	310
E140H	1140–1699	210	λ/228,000	114,000[j]	3	FUV-MAMA	0.2X0.2, 0.2X0.09	313
E230M	1605–3110	800	λ/60,000	30,000	2	NUV-MAMA	0.2X0.2, 0.2X0.06	304
E230H	1620–3150	267	λ/228,000	114,000[10]	6	NUV-MAMA	0.2X0.2, 0.2X0.09	307
MAMA Prism Spectroscopy								
PRISM	1150–3620	2470	0.2 - 72	10-2500	1	NUV-MAMA	25MAMA,52X0.05,52X0.1, 52X0.2, 52X0.5, 52X2	316

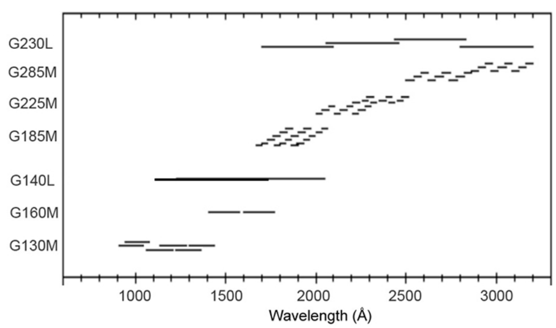
a. Number of exposures at distinct tilts needed to cover spectral range of grating with 10% wavelength overlap between adjacent settings.
b. For a complete list of supported and available-but-unsupported apertures for each grating, see Table A.1 on page 470.
c. Naming convention gives dimensions of slit in arcseconds. E.g., 52X0.1 indicates the slit is 52 arcsec long perpendicular to the dispersion direction and 0.1 arcsec wide in the dispersion direction. The F (e.g., in 52X0.2F1) indicates a fiducial bar to be used for coronagraphic spectroscopy.
d. For MAMA first-order modes, only ~ 25 arcsec of a long slit's length projects on the detector. (See also Section 4.2.2.).
e. Full-aperture clear (50CCD or 25MAMA), longpass-filtered (F25QTZ or F25SRF2 in UV), and neutral-density-filtered slitless spectroscopy are also supported with the appropriate first-order and echelle gratings, as well as the PRISM.
f. The following slits are also supported for all echelle gratings. The 6X0.2 and 52X0.05 long slits are intended for use with extended emission line objects; order overlap must be considered when using these slits. Also the high S/N multi-slits 0.2X0.2FP(A-E) and 0.2X0.06FP(A-E) (see Chapter 12), the very narrow 0.1X0.03 slit for maximum spectral resolution, and the 0.2X0.05ND and 0.3X0.05ND neutral density slits.
g. The 0.1X0.09 and 0.1X0.2 slits are supported with E230H only. F25MGII is supported with all NUV-MAMA gratings and the PRISM.
h. The 0.2X0.2 aperture is also supported with all first-order gratings. It is available-but-unsupported with the PRISM.
i. The F25SRF2 aperture can be used with the prism to filter out (geocoronal) Lyman-α emission.
j. Resolution of 200,000 or greater is possible when used with the 0.1X0.03 slit and special observing and data reduction techniques.

HST Focal Plane



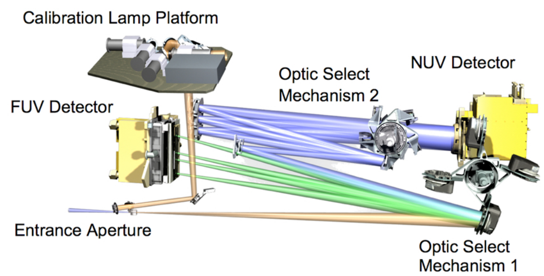
Instrument apertures and separations are shown to scale. The COS FUV and NUV channels view the same 2.5 arcsec patch of sky, but not simultaneously.

COS Wavelength Coverage



Wavelength coverage for each COS grating and central-wavelength setting. Additional settings may be available for some gratings. Note that spectral ranges for the NUV gratings are not contiguous.

COS Optical Design



External Light enters at lower left; common path to first element at lower right. FUV path in green; NUV path in blue; PtNe and D_2 input calibration beam in tan.

COS Grating Parameters

Spectral Element	Nominal Wavelength Range	Wavelength Coverage per exp (Å)	Resolving Power (R = λ/Δλ)†
G130M*	900 - 1236	296	3000 - 1000
G130M*	1067 - 1363	280	13k - 10k
G130M	1150 - 1450	292	16k - 21k
G160M	1405 - 1775	360	16k - 21k
G140L	< 900 - 2050	> 1150	1500 - 4000
G185M	1700 - 2100	3 x 35	16k - 20k+
G225M	2100 - 2500	3 x 35	20k - 24k+
G285M	2500 - 3200	3 x 41	20k - 24k+
G230L	1650 - 3200	1 or 2 x 398	2100- 2900

†Δλ is the empirically-determined FWHM of the LSF, which is not Gaussian. See COS Instrument Handbook for details. R increases approximately linearly with wavelength. COS was designed to observe primarily point sources; extended-source resolution will be lower.
*Setting available starting in Cycle 19.
**New settings available in Cycle 20.

COS
Cosmic Origins Spectrograph

Equipped with state-of-the art detectors and optics and optimized for maximum FUV throughput, COS provides moderate and low-resolution spectroscopy throughout the HST-accessible satellite ultraviolet, dramatically increasing the observatory's faint-object discovery power and spectroscopic efficiency.

Far Ultraviolet (FUV) Channel

- High-throughput, single-reflection design
- Dispersion axis corrected for spherical aberration
- 2 side-by-side 16k x 1k pixel delay-line MCPs
- TIME-TAG and ACCUM modes
- 2 medium-res gratings (Δλ ~ 300 Å, R ≥ 16,000)
- 1 low-res grating (< 900 - 2050 Å, R ~ 3,000)
- 2 new G130M settings (900 - 1236 Å, R ~ 2000)
- 1 new G130M settings (1067 - 1363 Å, R ~ 11,500)

Near Ultraviolet (NUV) Channel

- Two-axis spherical-aberration correction
- 1k x 1k 25μm/pixel MAMA
- TIME-TAG and ACCUM modes
- 4 gratings and 1 imaging mode
- 100-800 Å non-contiguous spectral coverage
- R ≈ 2000, 16k to 24k+; λ = 1650 - 3200 Å

COS was built through the collaborative efforts of the University of Colorado, Ball Aerospace, and Goddard Space Flight Center. COS was installed on the Hubble Space Telescope during Servicing Mission 4. The COS principal investigator is James Green (University of Colorado).

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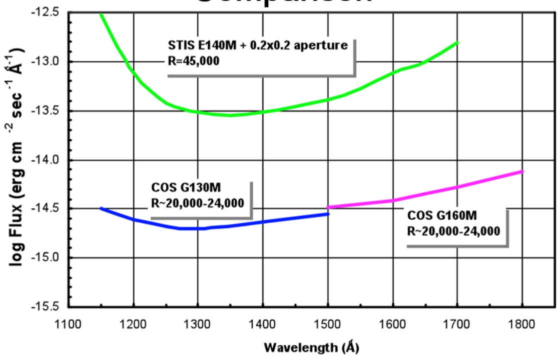
v7 May 2012

COS and STIS FUV Limiting Flux Comparison

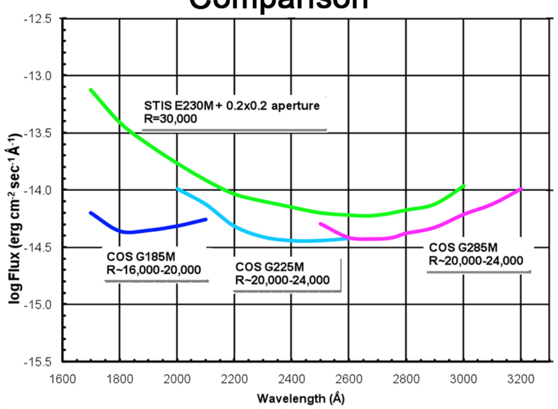


The figures above and below compare COS Primary Science Aperture (PSA) and STIS medium-resolution (M mode) performance by indicating the limiting flux for which S/N=10† can be achieved in 3600 sec exposures with a uniform binning corresponding to R~20,000 (bins of 0.08 Å for FUV and 0.12 Å for NUV). The superior light-gathering power of COS provides more than 10x the FUV throughput of STIS and up to 70x the FUV observing speed.

Note: COS Bright Object Aperture (BOA) performance limits are ≥150x brighter due to the BOA attenuation.

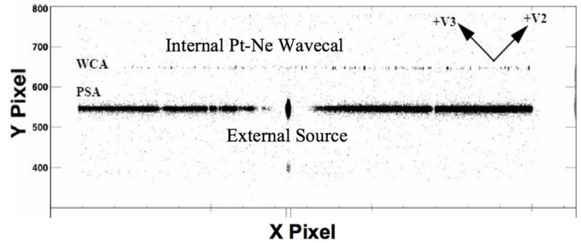
† Single COS exposures can provide up to S/N=30 (FUV) or 70 (NUV). Combining multiple FP-POS observations in certain circumstances yields S/N ≥ 100.

COS and STIS NUV Limiting Flux Comparison



For the most current COS sensitivities, please refer to the COS ETC at http://www.stsci.edu/cos/software/planning/etc

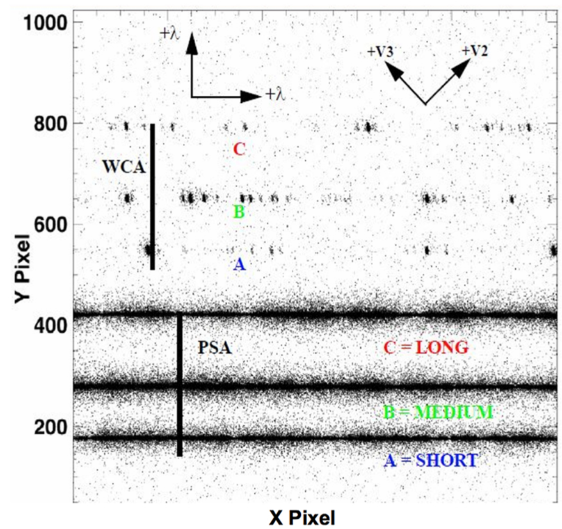
COS FUV Format



The figure above shows the typical spectrum format for a single COS FUV MCP detector segment. The COS FUV detector consists of two such segments separated by a small gap. Two spectra may be recorded as shown above. The lower spectrum is from an external source illuminating the prime science aperture (PSA); the upper spectrum is from the internal Pt-Ne wavelength calibration lamp, which illuminates the wavelength calibration aperture (WCA).

The figure below shows the typical spectrum format for the COS NUV MAMA detector. Three separate segments – labeled A, B, and C – of the dispersed first-order spectrum are directed by separate pickoff mirrors to illuminate slightly offset positions on the detector. The upper three stripes are from the internal Pt-Ne wavelength calibration lamp. The lower three stripes are from an external source illuminating the PSA.

COS NUV Format



COS and STIS Detector Characteristics

		COS/FUV	STIS/FUV	COS/NUV	STIS/NUV
Spectral Coverage (Å)	M	900 - 1775*,**	1150 - 1700	1700 - 3200	1600 - 3100
	L	910 - 2150	---	1650 - 3200	---
Effective Area (cm^2)	950Å	20 (G130M)	---	---	---
	1300A	3000 (M)	400 (M)	600 (M)	350 (M)
	2500Å	1800 (L)	1700 (L)	750 (L)	900 (L)
Resolution (λ/Δλ)	H	---	110,000	---	110,000
	M	16k - 21k	10k - 40k	16k - 24k	10k - 30k
	M (1222)	13k - 11k*	---	---	---
	M (1055, 1096)	3000 - 1000**	---	2100 - 3900	---
	L	1500 - 4000	1000		500
Number of Pixels along Dispersion		32768	1024 (2048)	1024	1024 (2048)
Background (cts s^{-1} $resel^{-1}$)		2.5×10^{-4}	9.0×10^{-4}	8.0×10^{-3}	1.1×10^{-2}
Background Equivalent Flux (erg cm^{-2} s^{-1} $Å^{-1}$)		3.05×10^{-17} G130M @ 1264 Å	9.0×10^{-15} E140M @ 1297.5 Å	2.7×10^{-15} G225M @ 2527 Å	8.0×10^{-15} E230M @ 2581 Å

* New in Cycle 20 a new central wavelength is available with the G130M grating, providing coverage between 1076 - 1363 Å at R ~ 13,000 - 10,000.
**In Cycle 19, the 1055 and 1096 central wavelengths of the G130M grating were introduced providing coverage between 900 - 1150 Å at R~2000.

COS TIME-TAG Mode

- Default mode for FUV and NUV; 32 msec sampling
- FUV pulse-heights improves background removal
- Unique TAGFLASH mode acquires wavecal spectra during science exposures; no on-target time lost

COS Imaging Mode Summary

Imaging Characteristic	COS/NUV
FOV area ($arcsec^2$)	12.5 (Full diameter) 4.9 (un-vignetted)
Effective Area (cm^2)	1500 (2300 Å) 100 (3200 Å)
Pixel Scale (arcsec)	0.024
Number of Pixels	166 (Full Diameter) 100 (un-vignetted)
Background Equivalent Flux (erg cm^{-2} s^{-1} $Å^{-1}$)	~ 2×10^{-18} (HSTMAG ~ 23.1)
Bandpass	1700 - 3200 Å

Table 1.2: Wavelength Ranges for FUV Gratings for FPPOS = 3

Grating	Central wavelength setting (Å)	Recorded wavelengths	
		Segment B	Segment A
G130M	1055[1]	900 - 1041	1055 - 1197
	1096[1]	940 - 1081	1096 - 1237
	1222[1]	1068 - 1208	1223 - 1364
	1291	1132 – 1274	1291 – 1433
	1300	1141 – 1283	1300 – 1442
	1309	1150 – 1292	1309 – 1451
	1318	1159 – 1301	1318 – 1460
	1327	1168 – 1310	1327 – 1469
G160M	1577	1382 – 1556	1577 – 1752
	1589	1394 – 1568	1589 – 1764
	1600	1405 – 1579	1600 – 1775
	1611	1416 – 1590	1611 – 1786
	1623	1428 – 1602	1623 – 1798
G140L[2]	1105	N/A[3]	1105 – 2253
	1230[4]	<300 – 1095	1230 – 2378
	1280	<500 – 1165	1280 – 2405

1. These are new modes that are currently being characterized, so these numbers are preliminary. 1055 and 1096 central wavelength settings have been offered starting from Cycle 19 and 1222 central wavelength mode starting from Cycle 20.
2. It is not yet clear how much of the G140L segment B short wavelength (< 900 Å) ranges will be available due to uncertainties in the HST OTA throughput. This is currently being investigated.
3. The G140L grating and 1105 central wavelength setting moves the zero-order image onto segment B. Therefore, only segment A is available for this setting.
4. Beginning in Cycle 18, the G140L 1230 setting was replaced by the 1280 setting.

NUV Spectroscopy

To retain efficiency utilizing the square format of the NUV detector, three mirrors simultaneously image three, fully aberration-corrected, spectra onto a single 1024 x 1024 Multi-Anode Micro-channel Array (MAMA) detector. Consequently, three separate regions of the spectrum are imaged onto the detector. These spectral regions, referred to as stripes A, B, and C, each span the physical length of the detector in the dispersion direction - but are not contiguous in wavelength space. The allowable grating positions were defined with two objectives: the capability of obtaining full spectral coverage over the NUV bandpass and maximizing scientific return with a minimum number of grating positions. As a result, several of the supported central wavelength positions were selected to maximize the number of diagnostic lines on the detector in a single exposure. Table 1.3 shows the wavelength ranges of the three stripes for all possible NUV grating and central wavelength combinations

Table 1.3: Wavelength Ranges for NUV Gratings

Grating	Central wavelength setting (Å)	Recorded wavelengths		
		Stripe A	Stripe B	Stripe C
G185M	1786	1670 – 1705	1769 – 1804	1868 – 1903
	1817	1701 – 1736	1800 – 1835	1899 – 1934
	1835	1719 – 1754	1818 – 1853	1916 – 1951
	1850	1734 – 1769	1833 – 1868	1931 – 1966
	1864	1748 – 1783	1847 – 1882	1945 – 1980
	1882	1766 – 1801	1865 – 1900	1964 – 1999
	1890	1774 – 1809	1872 – 1907	1971 – 2006
	1900	1783 – 1818	1882 – 1917	1981 – 2016
	1913	1796 – 1831	1895 – 1930	1993 – 2028
	1921	1804 – 1839	1903 – 1938	2002 – 2037
	1941	1825 – 1860	1924 – 1959	2023 – 2058
	1953	1837 – 1872	1936 – 1971	2034 – 2069
	1971	1854 – 1889	1953 – 1988	2052 – 2087
	1986	1870 – 1905	1969 – 2004	2068 – 2103
	2010	1894 – 1929	1993 – 2028	2092 – 2127

Grating	Central wavelength setting (Å)	Recorded wavelengths		
		Stripe A	Stripe B	Stripe C
G225M	2186	2070 – 2105	2169 – 2204	2268 – 2303
	2217	2101 – 2136	2200 – 2235	2299 – 2334
	2233	2117 – 2152	2215 – 2250	2314 – 2349
	2250	2134 – 2169	2233 – 2268	2332 – 2367
	2268	2152 – 2187	2251 – 2286	2350 – 2385
	2283	2167 – 2202	2266 – 2301	2364 – 2399
	2306	2190 – 2225	2288 – 2323	2387 – 2422
	2325	2208 – 2243	2307 – 2342	2406 – 2441
	2339	2223 – 2258	2322 – 2357	2421 – 2456
	2357	2241 – 2276	2340 – 2375	2439 – 2474
	2373	2256 – 2291	2355 – 2390	2454 – 2489
	2390	2274 – 2309	2373 – 2408	2472 – 2507
	2410	2294 – 2329	2393 – 2428	2492 – 2527
G285M	2617	2480 – 2521	2596 – 2637	2711 – 2752
	2637	2500 – 2541	2616 – 2657	2731 – 2772
	2657	2520 – 2561	2636 – 2677	2751 – 2792
	2676	2539 – 2580	2655 – 2696	2770 – 2811
	2695	2558 – 2599	2674 – 2715	2789 – 2830
	2709	2572 – 2613	2688 – 2729	2803 – 2844
	2719	2582 – 2623	2698 – 2739	2813 – 2854
	2739	2602 – 2643	2718 – 2763	2837 – 2878
	2850	2714 – 2755	2829 – 2870	2945 – 2986
	2952	2815 – 2856	2931 – 2972	3046 – 3087
	2979	2842 – 2883	2958 – 2999	3073 – 3114
	2996	2859 – 2900	2975 – 3016	3090 – 3131
	3018	2881 – 2922	2997 – 3038	3112 – 3153
	3035	2898 – 2939	3014 – 3055	3129 – 3170
	3057	2920 – 2961	3036 – 3077	3151 – 3192
	3074	2937 – 2978	3053 – 3094	3168 – 3209
	3094	2957 – 2998	3073 – 3114	3188 – 3229

Grating	Central wavelength setting (Å)	Recorded wavelengths		
		Stripe A	Stripe B	Stripe C
G230L	2635	1334 – 1733[1]	2435 – 2834	**1768 – 1967[2]**
	2950	1650 – 2050	2750 – 3150	**1900 – 2100[2]**
	3000	1700 – 2100	2800 – 3200	**1950 – 2150[2]**
	3360	2059 – 2458	3161 – 3560[3]	**2164 – 2361[2]**

1. The wavelengths listed for central wavelength 2635 Å in stripe A are for completeness only and also in case a bright emission line falls onto the detector. Note that the NUV detector's sensitivity at these wavelengths is extremely low. To obtain a low-resolution spectrum at wavelengths below about 1700 Å we recommend G140L and the FUV channel.
2. The values in shaded cells are wavelength ranges as seen in second-order light. In these cases the achieved dispersion is twice that for first-order mode. Note, however, that some first order light may contaminate the spectrum depending on the SED of the target.
3. The spectrum longward of 3400 Å may be contaminated by second order spectrum, depending on the SED of the target.

Grating Offset Positions (FPPOS)

For each NUV and FUV central wavelength setting there are four grating offset positions (`FPPOS`=1-4) available to move the spectrum slightly in the dispersion direction. This allows the spectrum to fall on different areas of the detector to minimize the effects of small scale fixed pattern noise in the detector. Figure 1.1 shows the shifts in uncalibrated x pixel coordinates of the stripe B spectra for all four `FPPOS` positions.