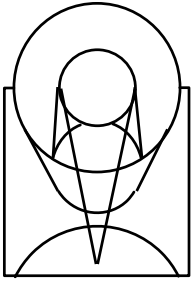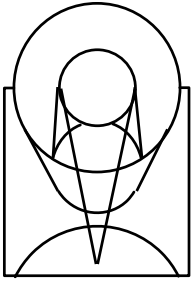# STUC - COS Update

13 April 2007

Agenda

- SMOV-related Activities

- STScI Thermal-Vac Activities

- Calibration Philosophy

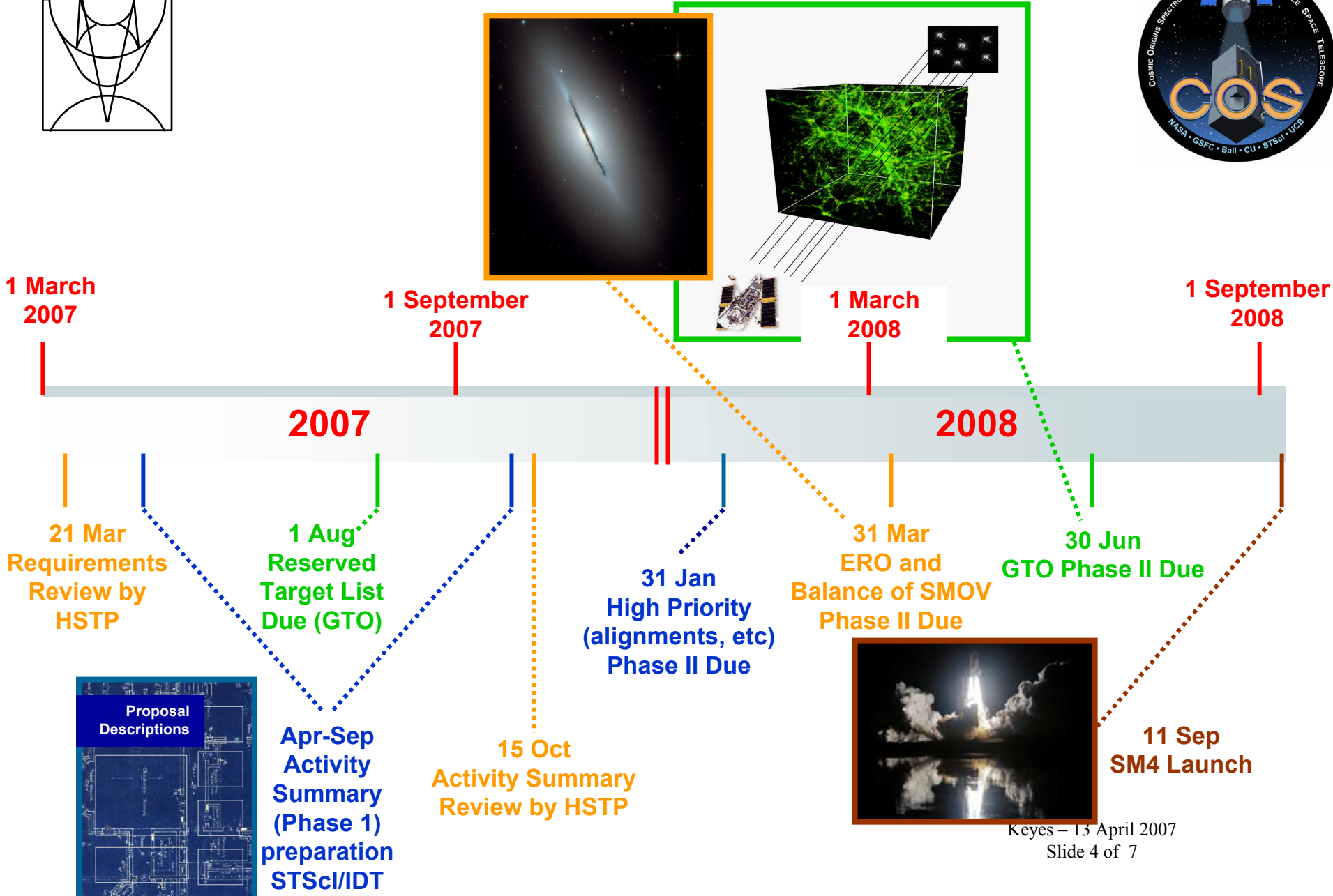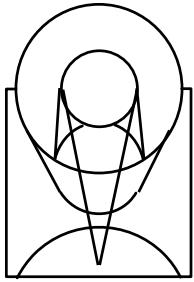- Ground System and User Support Activities

SMOV4 Activities

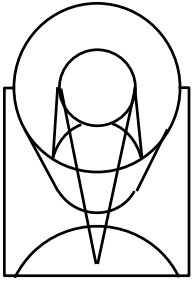- Successful SMOV4 "delta" requirements review by HSTP – March 2007
  - COS requirements expanded and updated for this review
  - No significant changes to COS requirements
- SMOV activity planning (Apr-Sep 2007)
  - Mapping of requirements to programs, assignment of resources, and program description (STScI and COS IDT)
- SMOV Project Review: Oct 2007
- SMOV Program generation: Nov 2007 – July 2008

SMOV4 Activity Timeline

1 March 2007

1 September 2007

1 March 2008

1 September 2008

2007

2008

21 Mar Requirements Review by HSTP

1 Aug Reserved Target List Due (GTO)

31 Jan High Priority (alignments, etc) Phase II Due

31 Mar ERO and Balance of SMOV Phase II Due

30 Jun GTO Phase II Due

Proposal Descriptions

Apr-Sep Activity Summary (Phase 1) preparation STScI/IDT

15 Oct Activity Summary Review by HSTP

11 Sep SM4 Launch

STScI Thermal-Vac Activities

- Successful TAGFLASH test conducted at COS T-V in Dec 2006
  - Exercised flashes for all gratings and wavelength settings
  - Identified modest updates to commanding due to lamp turn-on characteristics
  - Ongoing assessment and verification of OSM drifts

- FUV and NUV Thermal-Vac data processed by OPUS to be ingested in MAST

- Initial reference file delivery from IDT prior to SMGT in July 2007
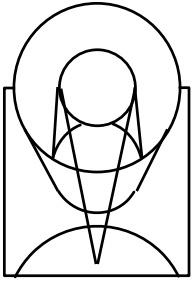
Calibration

- STScI and the COS IDT will jointly develop SMOV calibration programs

- All flux, wavelength, and spectral resolution standard targets will be chosen from the STScI HST calibration target list

  - Four additional faint WD standards (the FASTEX (Faint Standard Extension) stars were specifically observed with STIS in cycle 11, have been modeled to STScI requirements, and have been added as primary photometric standards in the STScI calibration database (Bohlin, Leitherer, and Finley)
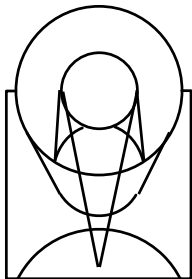
User Support and Ground System Summary

- **Astronomer Proposal Tools**
  - Spectroscopic ETC – in acceptance testing - complete in April 2007
  - Bright Object Evaluation tool – April 2007
- **COS Handbooks**
  - Mini-handbook v. 3.0 : October 2006 (cycle 16 CP)
  - Instrument Handbook v. 1.0
    - > First draft nearing completion; distribute with cycle 17 CP
- **STScI COS Website : suggestions welcome**
  - http://www.stsci.edu/hst/cos/
- **Proposal and Scheduling System**
  - All science exposure and calibration commanding is complete
- **CALCOS (Pipeline) Development**
  - Most pipeline steps tested against instrument data (screening, thermal distortion, geometrical correction, dead-time correction, flatfield, 1-d extraction, wavecal processing, etc)
  - TAGFLASH coded and partially tested - Final testing with TV II exposures

Cosmic Origins Spectrograph
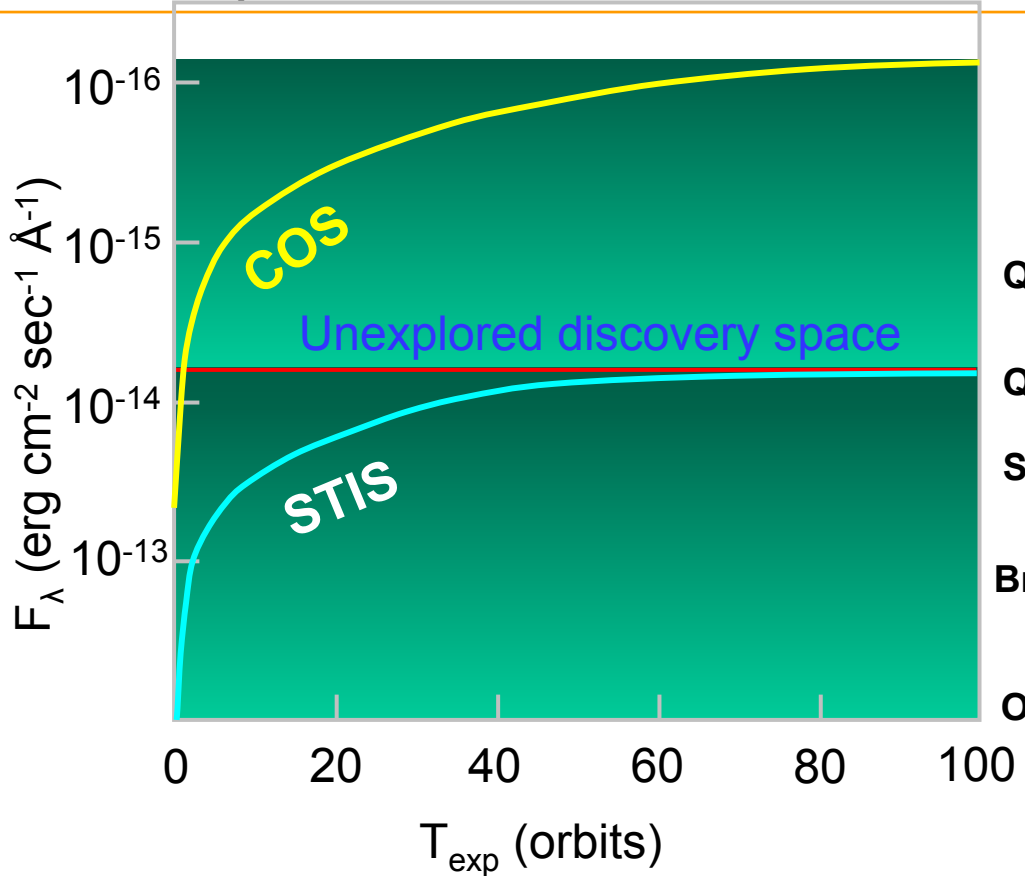## Supplementary Material
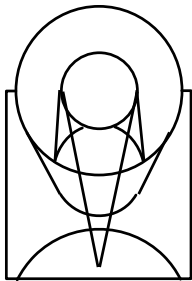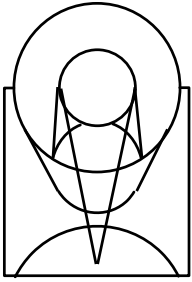
COS Discovery Potential

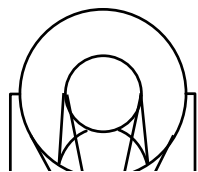**Limiting flux as function of exposure time to reach S/N=10 with spectral resolution $\lambda/\Delta\lambda$=20,000 at 1600 Å**

COS

Unexplored discovery space

STIS

F_λ (erg cm^{-2} sec^{-1} Å^{-1})

T_{exp} (orbits)

QSO (Reionization)

QSO (z ~ 0.5)

Starburst galaxies

Brightest QSO (3C 273)

OB stars in the Magellanic Clouds

Increasing # of objects

Discovery potential

Cosmic Origins Spectrograph
Detector Characteristics

	FUV MCP	NUV MAMA
Photocathode	CsI (opaque)	Cs_2Te (semi-transparent)
Window	None	MgF_2 (re-entrant)
Wavelength range	1150 – 2050 Å	1700 – 3200 Å
Active area	85 x 10 mm (two)	25.6 x 25.6 mm
Pixel format	16384 x 1024 (two)	1024 x 1024
Pixel size	6 x 24 μm	25 x 25 μm
Spectral resolution element size	6 x 10 pix	3 x 3 pix
Quantum efficiency	26% at 1335 Å 12% at 1560 Å	10% at 2200 Å 8% at 2800 Å
Dark count rate	~0.5 cnt s^{-1} cm^{-2} ~7.2x10^{-7} cnt s^{-1} pix^{-1} ~4.3x10^{-5} cnt s^{-1} $resel^{-1}$	~34 cnt s^{-1} cm^{-2} ~2.1x10^{-4} cnt s^{-1} pix^{-1} ~1.9x10^{-3} cnt s^{-1} $resel^{-1}$
Detector global count rate limit — TTAG	~21,000 cnt s^{-1}	~21,000 cnt s^{-1}
Detector global count rate limit — ACCUM	~60,000 cnt s^{-1} $segment^{-1}$	~170,000 cnt s^{-1}
Local count rate limit	~100 cnt s^{-1} $resel^{-1}$ ~1.67 cnt s^{-1} pix^{-1}	~1800 cnt s^{-1} $resel^{-1}$ ~200 cnt s^{-1} pix^{-1}
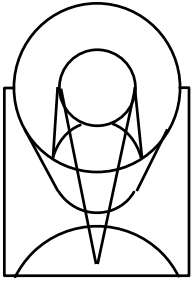
COS Spectral Resolution and Bandpass Summary

- **FUV channel**
  - G130M   R > 20,000 $\lambda\lambda$ 1150-1450
  - G160M   R > 20,000   1405-1775
  - G140L   R > 2,000   1230-2050

- **NUV channel**
  - G185M   R > 16,000   1700-2100 (3x35)
  - G225M   R > 20,000   2100-2500 (3x35)
  - G285M   R > 20,000   2500-3000 (3x41)
  - G230L   R > 1,700 (most of bandpass) 1700-3200

- **Bright Object Aperture (BOA) resolution degraded**
  - Wedge in ND filter degrades resolution by factor of ~2.5 for FUV modes and ~4 for NUV modes.