Center for Astrophysics and Space Astronomy

COS
January
Monthly Status Review
February 1, 2000
GSFC

Cosmic Origins Spectrograph
Hubble Space Telescope

Agenda

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Progress Summary Since Last Monthly

- Awarded NUV grating contract to JY.
- Awarded G140L blazed effort to JY.
- Successfully aligned 1st G130M grating and completed imaging test.
- UCB received 1st set of fully processed anodes.
- UCB started assembly of DCE-A, B, C boards.
- UCB received 2 flight HVFM from Battel Engineering.

Tinsley & J-Y Status

- Tinsley:
  - At work on NUV optics.
  - Planned delivery schedule:
    - Flight units due 5/15/00
    - Spares due 7/15/00
- J-Y:
  - Late December storms in France flooded JY's production facilities.
  - No COS gratings or substrates were damaged.
  - Facilities were cleaned and restored throughout January.
  - G160M gratings had been holographically recorded but not yet ion etched.
  - G160M ETUs have been fully processed and exceed COS requirements.
  - JY's delivery schedule is slipping approximately 6 weeks for G160M grating and 2 weeks for all G140L and NUV gratings (see schedule).

UCB FUV Detector Status - General

- It's important to note that UCB has overcome significant technical challenges that compromised the FUSE development (MCPs, detector bodies, progress on anodes,etc.) – this is the good news.
- Unfortunately, over the past few months UCB has suffered significant schedule erosion in many areas of the project for primarily programmatic (not technical) reasons. CU is very concerned with UCB's schedule performance.
- Further compounding UCB's schedule problems is the loss of their lead EE and the uncertainties associated with the earthquake retrofit of the old SSL building.
- These issues, and others, were reviewed by CU and GSFC at a UCB status review held at UCB on January 19 and 20.

UCB FUV Detector Status - Personnel Issues

- Problem -

  In early January, UCB's lead EE quit.

  - The EE was responsible for the analog electrical system and was the FUV Detector Electrical System Engineer at UCB.
  - The EE had completed all design work except for the final FPGA designs for the TDCs.
  - The TDC circuit designs are completed and are awaiting fabrication at J&T.
  - The flight Amps are assembled and at UCB awaiting test.
  - An ETU COS Amp has been successfully tested at UCB.

UCB FUV Detector Status - Personnel Issues (cont.)

- Solution(s) – For the time being, a patchwork of solutions is in progress:
  - UCB is in the process of advertising now to find a long-term replacement.
  - UCB/CU/D_N are all looking for EE's who could back-fill at UCB immediately.
  - Because CU was proactive several months ago and authorized D_N to initiate an independent FPGA review, D_N has a resource that can immediately fill in and complete the TDC FPGA design and implementation.
  - In the near term, UCB has arranged for a former lab employee to support board testing and diagnostics ~ 1 day/week. This resource is one of the original designers of the digitizing circuits.
  - Another former UCB employee – now an independent contractor – can come on board immediately to initiate acceptance testing and integration preparation of the deliverables from Battel Engineering.

UCB FUV Detector Status - Personnel Issues (cont.)

- Concerns – Although the present patchwork of solutions allows progress to continue (albeit with less efficiency) we have lost a resource that was the "owner" of the electrical systems at UCB. Until we find a long-term solution by filling the EE opening at UCB, we should be concerned that the effort will be inefficient, fragmented, and a time and resource drain on the rest of the efforts at UCB.

UCB FUV Detector Status - Facilities

- As mentioned at the December MSR, UCB was successful in getting funds from Explorers to augment/enhance their facilities in the new building.
- The second calibration facility's vacuum systems are online and work is progressing on the control rack and detector manipulation system.
- Modifications to the old building are presently not planned to start any earlier than 6/00.

UCB FUV Detector Status - Detector Vacuum Assembly

- MCPs:
  - This activity is on schedule.
  - COS MCPs are now being installed into a COS detector body in preparation for initial compatibility and performance assessments of the COS flight-like stack-up.
- XDL Anodes:
  - This activity is behind schedule with a work-around already being implemented.
  - First set of flight anodes (qty. = 4)were processed incorrectly over the holiday timeframe. Manual rework of two units has allowed some testing to continue and initial test results look promising.
  - Second set of anodes (qty = 8) are now in process and should be complete by late March.
  - UCB insists there is no way to expedite the present schedule for the 2nd batch processing. UCB claims to understand the process problem that created difficulties for batch 1 and has reassured us it won't be repeated.

UCB FUV Detector Status - Detector Vacuum Assembly

- Detector Bodies:
  - This activity is on schedule and in very good shape.
  - All three bodies have completed all component processing and have just recently completed Hi-Pot testing.
- Amplifiers:
  - This activity is on schedule but is at risk due to loss of EE.
  - COS ETU Amps have been successfully tested.
  - UCB is awaiting delivery of some final parts for installation at UCB.
  - Flight units are then ready for test once a resource has been identified to conduct the tests.
- Harnessing:
  - This activity is about to commence at UCB.
  - Harness planning is going on now.
  - UCB visited Ball in November to plan routing of flight DEB to DVA harness.

UCB FUV Detector Status - Detector Vacuum Assembly

- QE Enhancement Grid:
  - This is not a critical path activity and is now being worked at UCB.
  - Two options are presently being pursued at UCB and late implementation of either should not be problematic.
- Detector Backplates:
  - This activity is behind schedule due to processing difficulties at the vendor.
  - Vendor incorrectly machined through-holes in a vacuum wall – part was scrapped. UCB is using scrapped part for pathfinder in downstream handling and process steps.
  - Initial vendor is now machining two correct units.
  - UCB has been directed to and is pursuing fabrication of two additional units at a back-up vendor.
  - Parts from both vendors are expected to arrive mid-February (~ 1 month late).

UCB FUV Detector Status - Electronics

- Power Systems:
  - These activities are on schedule.
  - Battel Engineering (BE) delivered two flight HVFM to UCB on 1/21/00.
  - BE schedule to deliver two HVPS units mid-February and two LVPS by March 1.
- Digitizers (TDC-X, TDC-Y):
  - These activities are behind schedule.
  - The departing EE has completed the design work and the PWBs have been fabricated.
  - Assembly paperwork for J&T is in process at UCB now.
  - Parts kitting can commence this week after UCB's visit to J&T tomorrow.
  - The ETU TDC has been assembled at UCB and the temporary UCB EE will start debugging that unit this week.
  - If all parts are available and kitted in a timely fashion, TDC-X, Y should arrive UCB by mid-March.

UCB FUV Detector Status - Electronics

- Detector Control Electronics (DCE-A, B, C):
  - These activities are behind schedule.
  - Designs are now complete (except final FPGA design) and PWBs have been fabricated.
  - There continues to be delays in either:
    - Getting parts ordered
    - Getting parts kitted
    - Getting assembly paperwork squared away
    - Getting the assemblies stuffed
  - CU/UCB/GSFC are visiting J&T tomorrow to discuss and work the above issues.
  - At present, the completed assemblies should be shipped to UCB sometime in mid-February if the parts issues can be resolved.
  - A different EE at UCB "owns" the DCE and, therefore, there is not an identified resource constraint on getting these boards tested and integrated into the FUV subsystem.

UCB FUV Detector Status - Software

- Due to the efforts of CU's K. Brownsberger and several members of the FSW/Ops team @ Ball, this activity at UCB is now progressing.
- Documentation Status:
  - DCE FSW CM Plan - released
  - DCE FSW Mngmt. Plan - in development by CU
  - DCE FSW Requirements Doc - released
  - DCE FSW Design Document:
    - Initial review was held in 10/99
    - Design and documents revision 11/99 - 1/00
    - Issue revised SDD 1/31/00
    - Delta-Design Review at CU 2/18/99
  - DCE FSW Test Plan - in development by D_N/CU
- Coding and testing scheduled to start in February using ETU DCE.

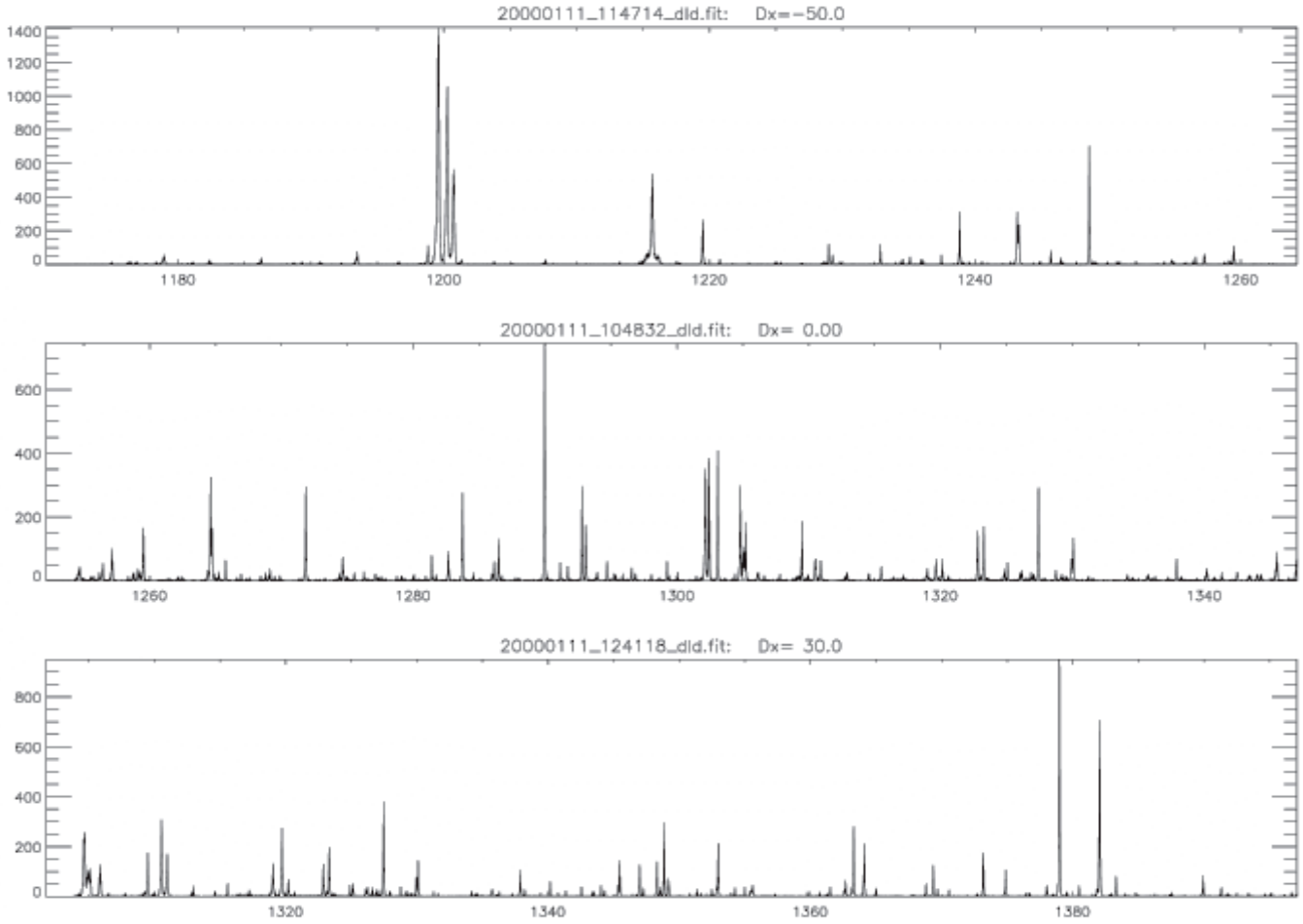
UCB FUV Detector Status - Systems

- UCB has recently completed several system level documents:
  - CM Plan - released
  - QA Plan - released
  - Performance Verification Plan - released
  - ICD Rev. A - in pre-release review
  - Environmental Verification Plan - in pre-release review
- UCB is now working out the details of their I&T flow and plan.
- Parts stress analysis has been completed on the DCE and TDC boards.
- Upcoming activities to include DVA backplate stress analysis and fracture control assessment.

UCB FUV Detector Status - Summary & Issues

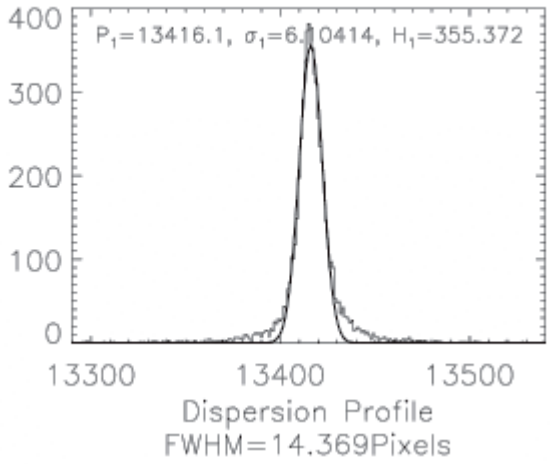
- UCB has consistently had difficulties in preparing and maintaining adequate schedules and program plans.
  - To address this problem, CU will be increasing the frequency of their site visits to UCB form monthly to at least bi-weekly.
  - Later this year, as I&T progresses at UCB, CU had already planned on having personnel at UCB for long-term I&T insight and support.
- Issues associated with the loss of UCB's lead EE are being worked
  - An interim patchwork of resources are lined up to support discrete tasks for the next 6 weeks.
  - UCB has initiated a search for a long-term replacement.
- UCB has been very effective at solving and overcoming technical challenges - all indications are that we are getting an excellent detector. The primary concentration now is on getting the detector on time.

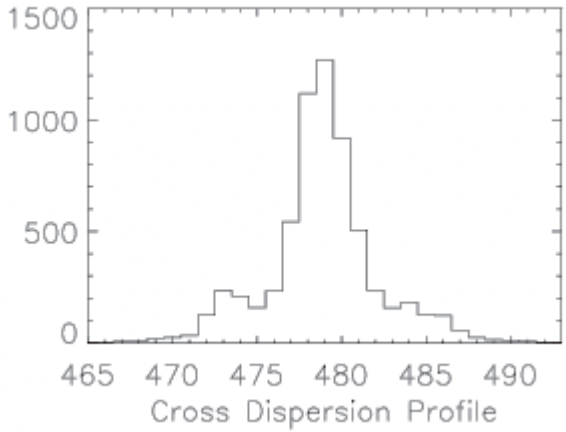
G130M-C Platinum Spectrum



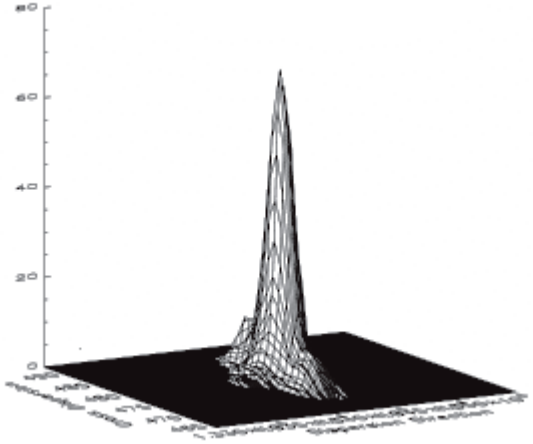
Cosmic Origins Spectrograph
Hubble Space Telescope

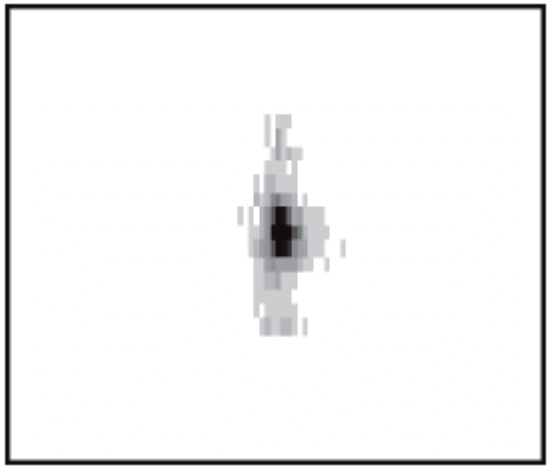
James Green
February 1, 2000



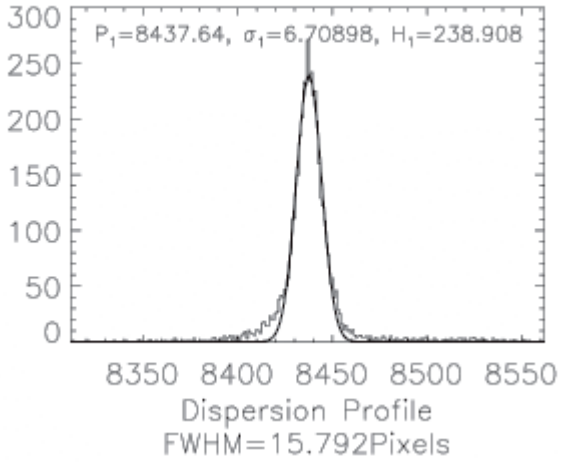


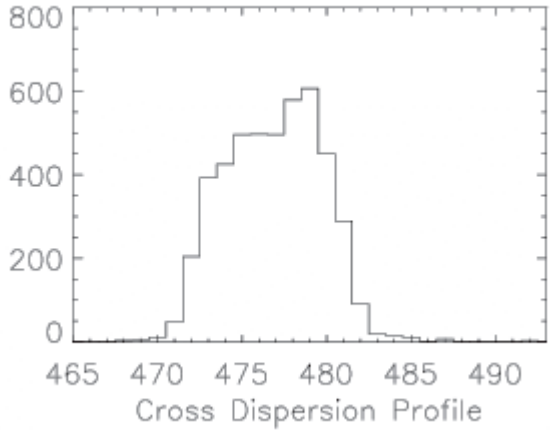
G130M-C
Resolution (1/3)



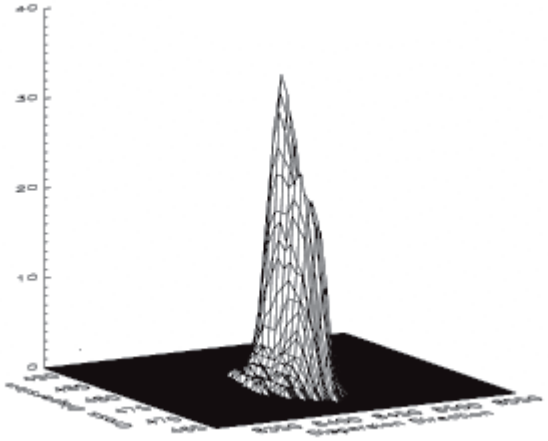


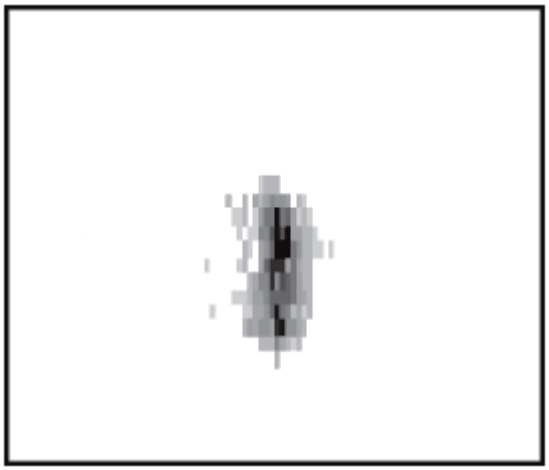
- λ=1219.5Å
- FWHM=54.2mÅ
- λ/Δλ=22500



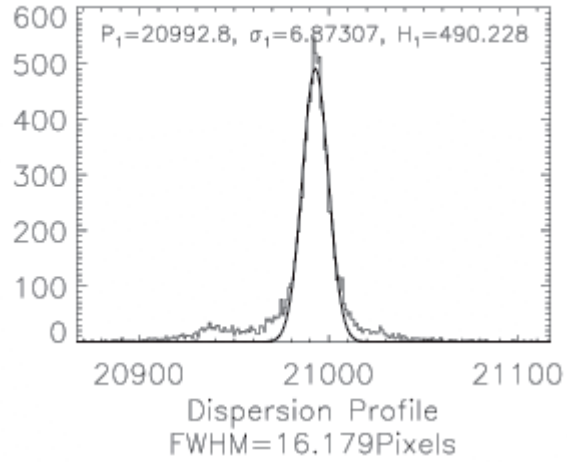


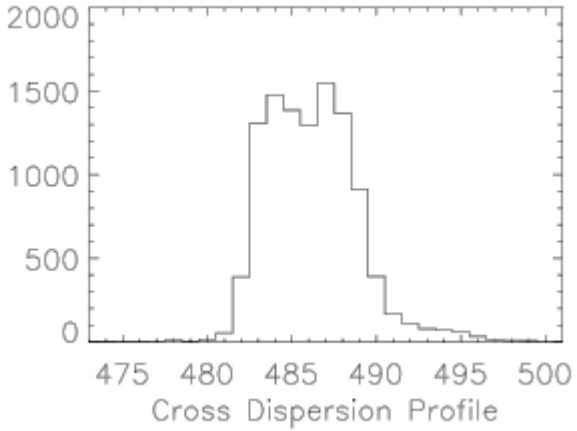
G130M-C
Resolution (2/3)



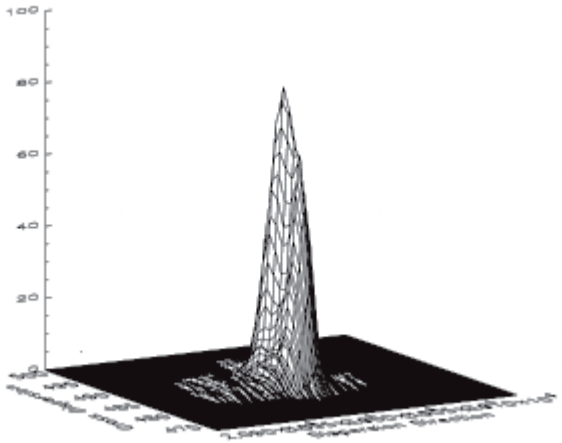


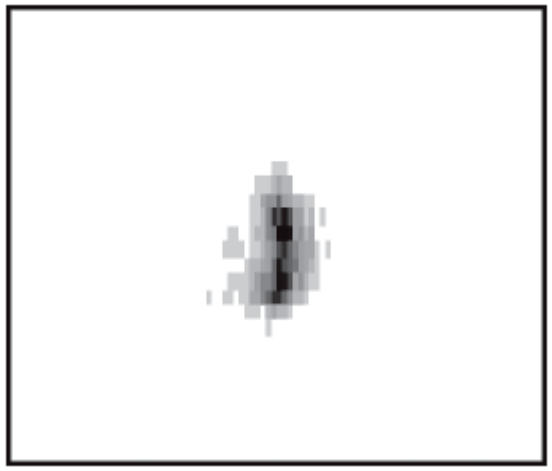
- λ=1283.7Å
- FWHM=59.6mÅ
- λ/Δλ=21500





G130M-C
Resolution (3/3)





- λ=1382.0Å
- FWHM=62.3mÅ
- λ/Δλ=22200

Operations & Software Activities at CU

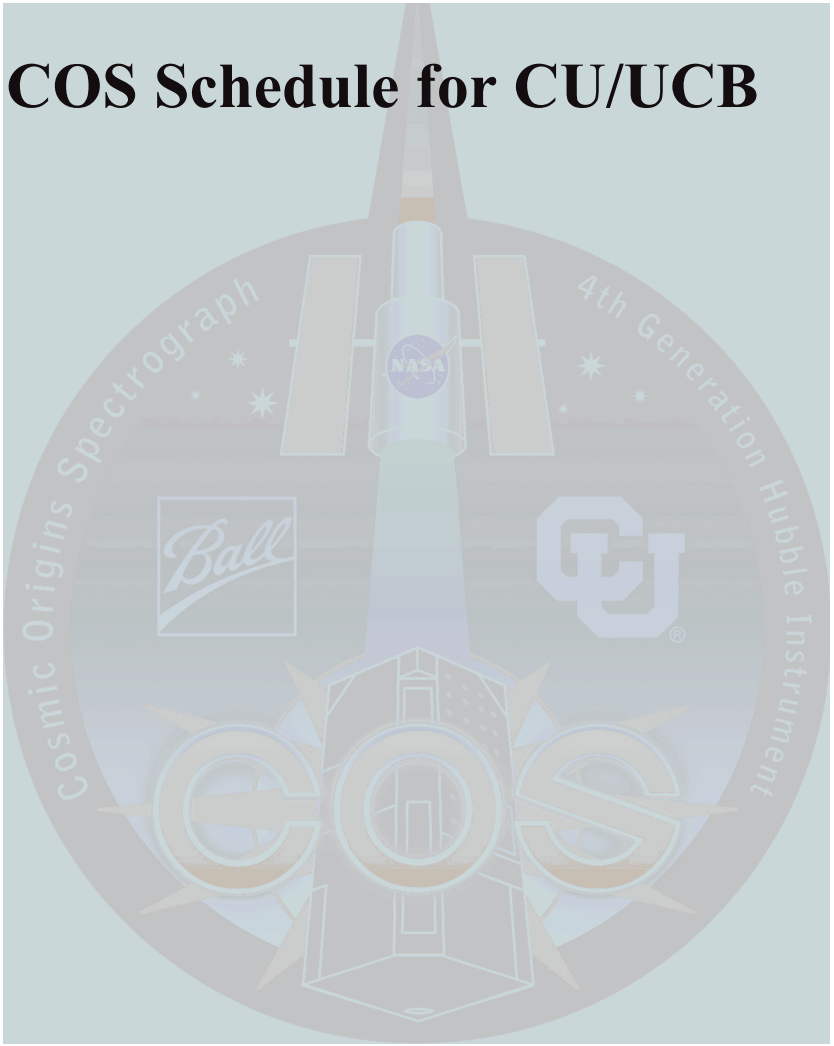
- GSE Software Development at CASA-ARL
  - COS Science Data Index and Analysis Software (CEDAR)
    - Build I Software Completed - 12/10/1999.
    - Build I Demo of CEDAR at BATC - 12/14/1999.
    - Modifications based on Demo feedback incorporated - 1/17/2000.
    - Build II schedule on track for release in 4/2000.
  - COS Target Acquisition Simulation Software (TAACOS)
    - Requirements Document for TAACOS released for signatures - 1/25/2000.
    - Minor problem with incorporating RayTrace code into TAACOS. Resolved - 1/28/2000
    - Build I Software for FUV channel by 4/2000.
    - Build I Software for NUV channel by 5/2000.
    - Build II Software - contingent upon results of Target Acquisition Simulations from Build I, but no earlier than 7/2000.

Operations & Software Activities at CU

- Assistance with FSW Development Efforts at UCB
  - DCE FSW Documentation Efforts
  - Website gives full details of DCE Documentation efforts underway:
  - http://cos-arl.colorado.edu/DCE/
- Highlights:
  - DCE Software Design Document - to be released for formal review on 1/31/2000.
  - DCE Software "Delta" Design Review - 2/18/2000 at CASA-ARL.
  - DCE Hardware/Software Interface Document - to be released for review on 2/7/2000.
  - DCE Software Test Plan - Draft to be released for informal review on 2/21/2000.

Center for Astrophysics and Space Astronomy

COS Schedule for CU/UCB



John Andrews
February 1, 2000

Upcoming Events/Activities

- Complete G130M-c optical testing and start G130M-b testing.
- Host DCE FSW delta-Design Review at CASA on 2/18/00.
- Address and resolve resource problems at UCB.
- UCB receive DCE-A, B, C assemblies.
- UCB continue anode batch #2 processing.
- UCB receive and commence testing on flight power systems.
- UCB commence FSW code and test on ETU DCE.

Questions, Issues & Resolution Plan

- None