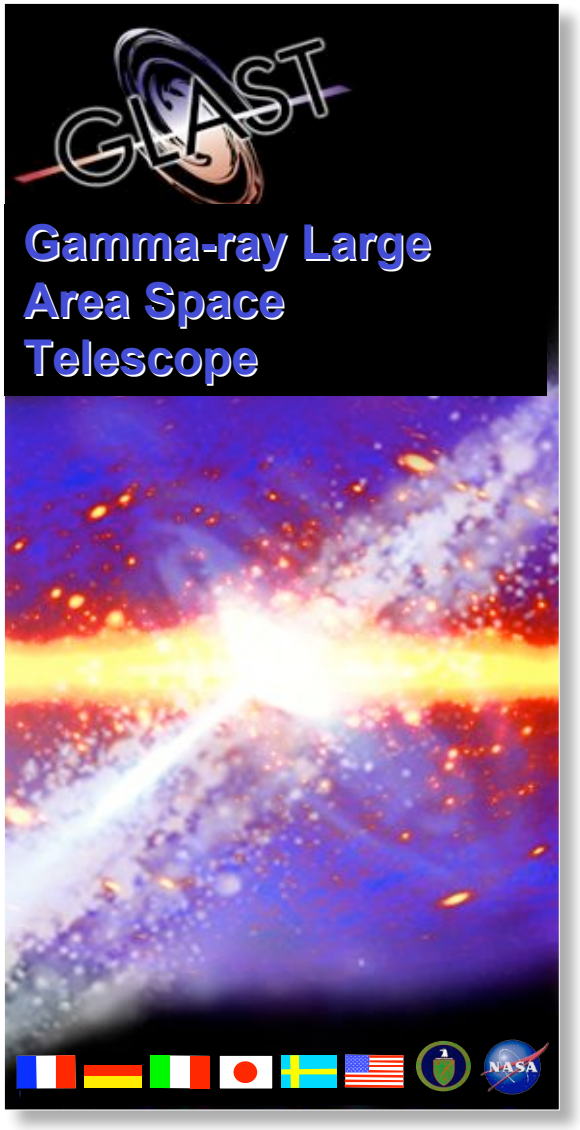


GLAST

The Gamma-ray Large Area Space Telescope

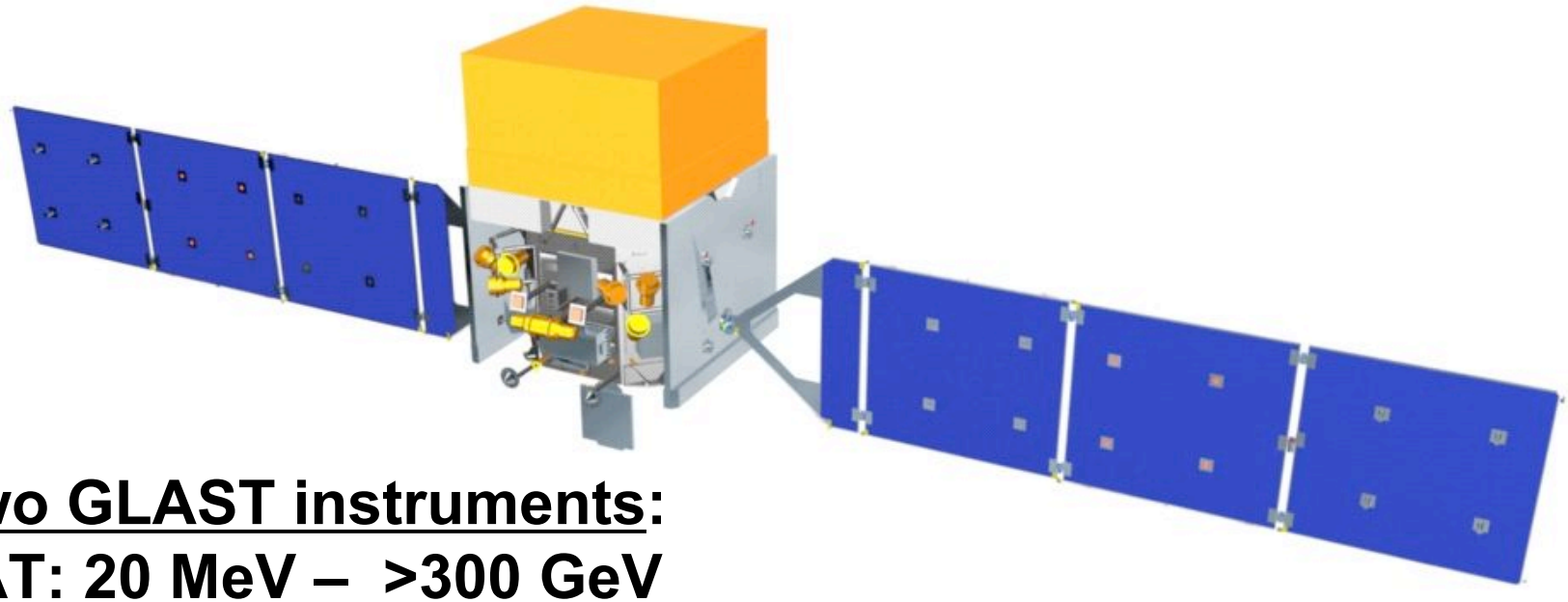
Mission Status and Issues for Discussion
Users Committee Meeting
4 February 2007

S. Ritz
J.E. McEnery

Topics

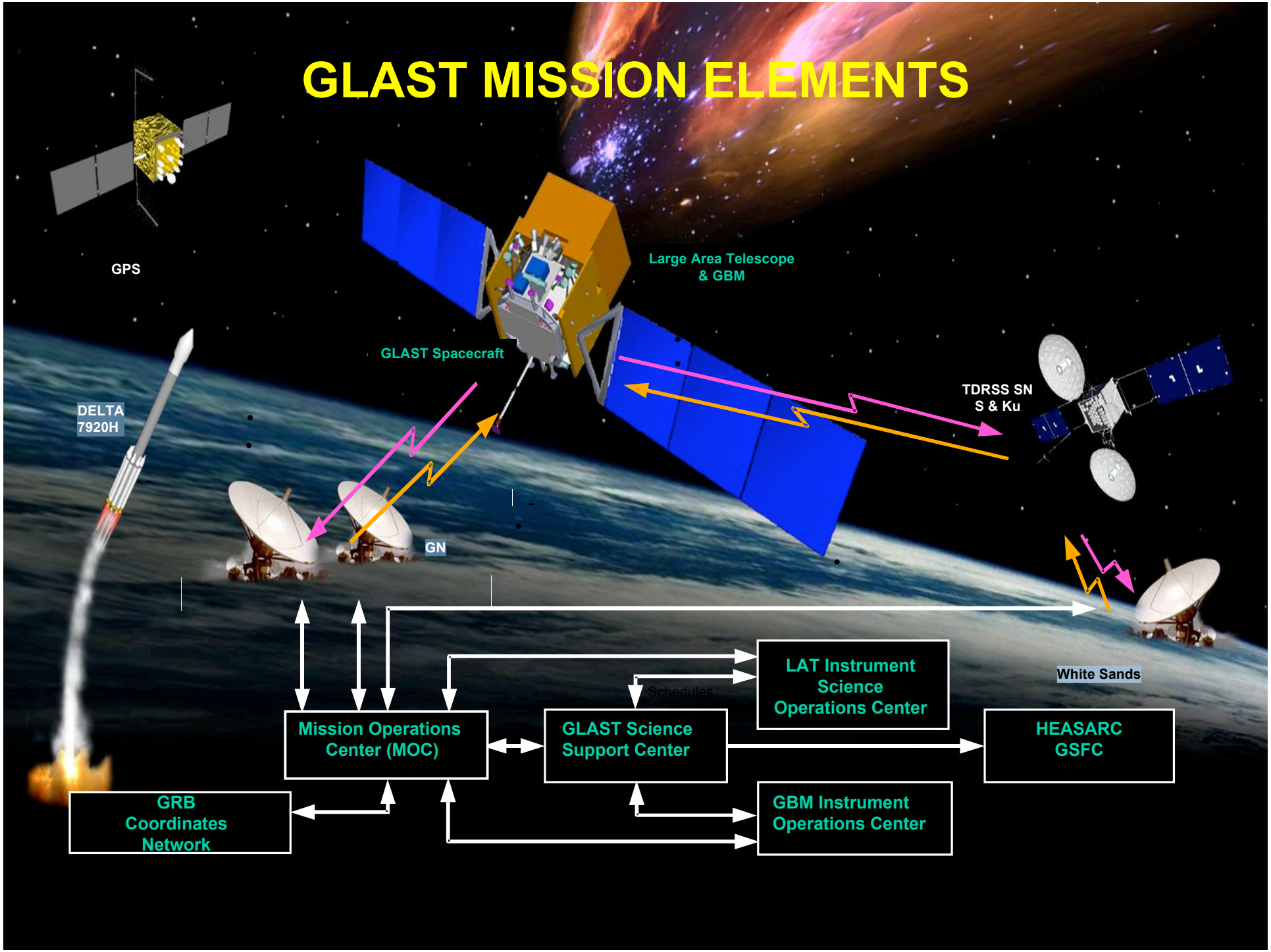
- Overall project status (LAT and GBM in separate presentations)
- Focus on issues and activities since the November meeting
  - presence at recent/upcoming meetings
    - AAS special session; booth; 14 posters
  - home for the Fellows Program
    - great progress! GLAST path identified and pursued, proposal received from CRESST (scientific organization UMD/USRA which has cooperative agreement with GSFC).
  - getting the word out about the GI program:
    - visits to Chandra, JPL/Spitzer. More to follow.
    - workshops (one at GSFC in January)
  - recent connections with other facilities
    - further discussions with NRAO (Ulvestad), iterated NRAO MOU (discussion later today)
    - results of discussions with Chandra and Spitzer
  - Pulsar community representation
  - SWG activities and Symposium
  - Launch invitations
  - Community inputs to the monitored source list

Context: GLAST Observatory



<u>Two GLAST instruments</u>:
LAT: 20 MeV – >300 GeV
GBM: 10 keV – 25 MeV

<u>Spacecraft</u>
General Dynamics Advanced Information Systems (AIS)


GLAST MISSION ELEMENTS
GPS
Large Area Telescope
& GBM
GLAST Spacecraft
TDRSS SN
S & Ku
DELTA
7920H
GN
White Sands
LAT Instrument
Science
Operations Center
Schedules
Mission Operations
Center (MOC)
GLAST Science
Support Center
HEASARC
GSFC
GRB
Coordinates
Network
GBM Instrument
Operations Center

Spacecraft

- Observatory integration almost complete.
  - All hardware (except flight battery and Antenna Pointing Assembly) at GD.
- Solar array
  - panels complete, tested, and delivered to GD.
  - Both arrays assembled, dynamics tested, post-test deployment and capacitance tested and ready for TVAC testing.
- RF compatibility tests last month successful.
- Some issues:
  - Integrated Electronics Module (IEM) completion. Impacts to critical path being mitigated through use of the engineering model, but starting to threaten launch date.
  - Antenna pointing array position readback noise understood. Unit de-integrated and returned to the manufacturer for rework.
- FSW and scripts to support the first observatory Comprehensive Performance Tests.
- Environmental testing to commence in March.

Launch Vehicle

- **Delta II transonic issue resolved.**
  - **no loads impacts on GLAST requiring structural modifications**
  - **hold on Delta II launches lifted**

- **Preparations for prep/operations at the Cape in full swing.**

Ground System/Fight Operations

- Mission Operations Center (MOC) development largely completed.
- Most recent mission operations meeting (TIM) 30-31 January in Phoenix.
- Tests!! 

Mission Level Testing

Test	Goals	
ETE #1A and B Basic Observatory T&C (2/26/07 & 3/2/07)	•*Configure Observatory to produce each downlink rate* •*Verify proper receipt of HK telemetry at each downlink rate* •*Command Observatory at all uplink rates* •*Generate S/C C&DH diagnostic telemetry* •*Playback data from SSR and perform SSR management activities* •*Configure Observatory to write HK telemetry to S/C CPU RAM* •*Command dump of HK telemetry from S/C CPU RAM and verify receipt and format of data.*	•*Issue No-op commands to instruments* •*Load and execute simple stored command loads (ATS & RTS)* •*Dump science data from SSR* •*Generate diagnostic data from the S/C and instruments.* •*Verify proper receipt of diagnostic data* •*Provide Level-0 files to the IOC's (post-test)*
ETE #2 Advanced Commanding / Memory Management (5/21/07 – 5/23/07)	•*Initialize the SSR* •*Generate S/C C&DH and GNC diagnostic telemetry* •*Load and execute advanced stored command loads (ATS & RTSs)* •*Perform Memory/FSW table uploads (S/C and instruments)* •*Dump Memory/FSW tables (S/C and instruments)* •*Power on Instruments*	•*Flow Real-Time Instrument HK TLM packets to LISOC* •*Power on components required during L&EO (i.e. Star Trackers, SADAs, and APA)* •*Execute instrument nominal operations procedures*
ETE #3 Advanced Operations (7/10/07 – 7/12/07)	•*Initiate an Autonomous Re-point* •*Perform ToO exercise to verify system interfaces* •*Perform ATS buffer handover/switch* •*Initiate a Burst Alert and flow data to GIOC BAP* •*Perform obit determination exercise* •*Exercise clock management* •*Perform FSW patches (S/C and instruments)*	•*Exercise SSR re-dump operations and frame accounting* •*Exercise instrument diagnostic/calibration procedures* •*Perform Observatory checkout & activation sequences* •*Perform instrument side switching/alternate configurations*
ETE #4 Advanced & Contingency Ops (8/11/07 & 8/12/07)	•*Perform component failover/side switching/alternate configurations (S/C and Instruments)* •*Perform Safe Mode recovery* •*Perform more advanced/complex FSW patches/updates*	
ETE #5 Advanced Operations & Clean-up *(8/20/07 & 8/21/07)*	•*Perform leap second adjustment* •*Test requirements and goals not verified in previous ETE tests* •*Verify system updates (i.e. software updates, proc updates, and T&C database updates)*	
ETE #6 Launch Site Test at Astrotech (10/9/07 & 10/10/07)	•*Check-out of Launch Site specific data paths* •*Perform a selected set of regression tests*	

SWG Activities

- Membership includes international representatives from LAT and GBM, along with four Interdisciplinary Scientists (IDS)
  - Chuck Dermer, Brenda Dingus, Martin Pohl, Steve Thorsett
- Advises mission and NASA, primarily now on Science Requirements

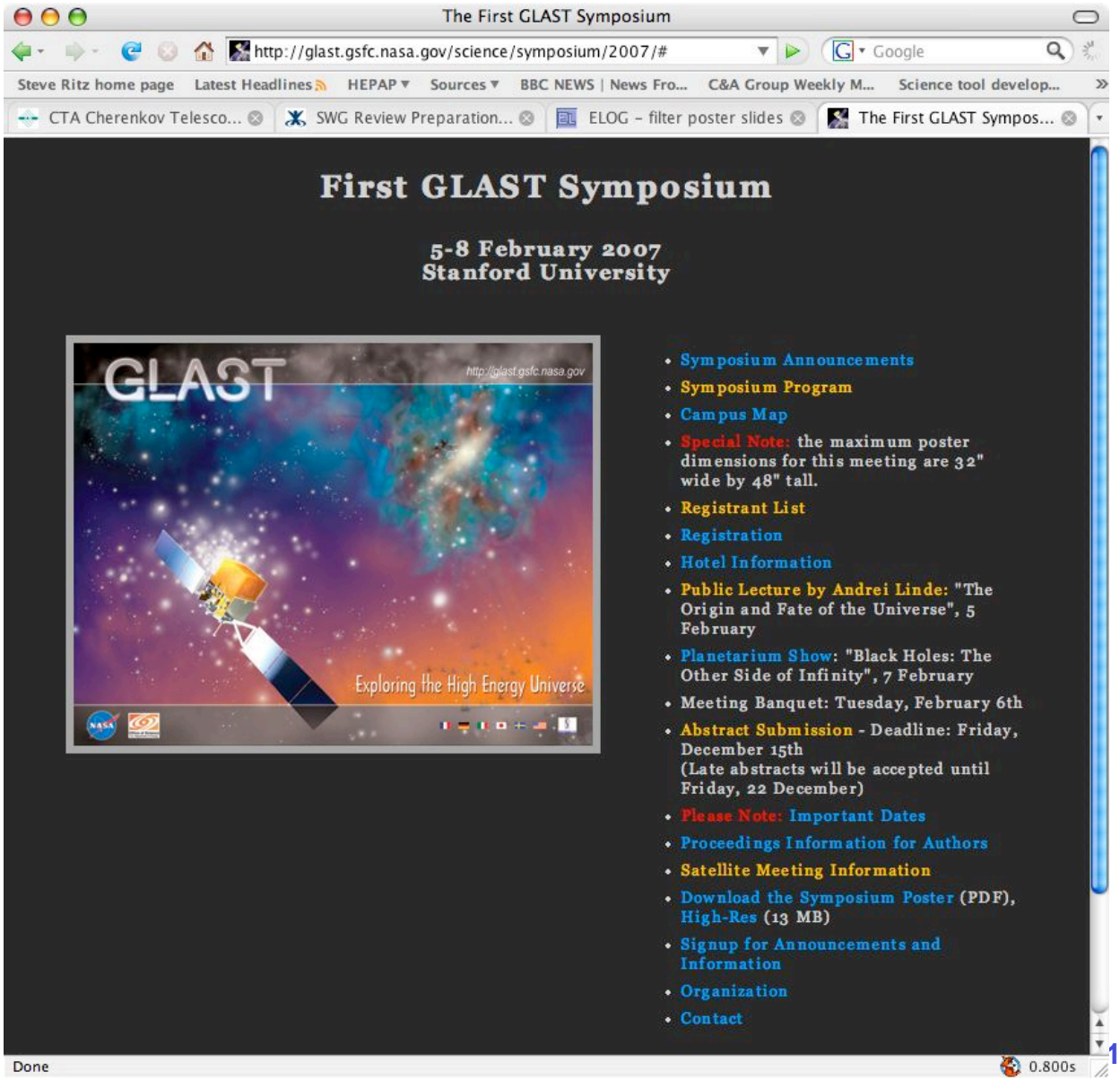
- SWG scientific review of the expected performance (LAT, GBM, Observatory) relative to the Science Requirements on 2 February.
  - see http://glast.gsfc.nasa.gov/science/swg/feb07/

Symposium

Quality and quantity of contributions exceeded expectations:

- ~275 abstracts received!
- >333 registrants

Also started monthly GLAST news email



Recent Connections with Other Facilities

- **Draft agreement with NRAO now in review**
  - **cooperative time and proposal review opportunities identified.**
- **Visits and discussions with Chandra and Spitzer science centers**
  - **share information about Guest Investigator programs, fellowship programs, identify any areas of needed coordination, cooperation**
  - **given mission characteristics, not many areas of formal cooperation may be necessary.**
    - **Chandra: only case identified is (rare) possibility of pointed observations for both facilities: how to assure Chandra peer review that GLAST pointed observations are both needed and accepted?**
      - **Consider giving Chandra peer review a very small amount of GLAST pointed observation time (1-2 weeks) with technical evaluation of any such proposals of need for pointing.**
      - **Similar deal/issues with XMM/Newton, others? How much of the pointed observation time (if any) may be allocated by other peer reviews? If done, need to ensure it does not conflict in timeline with other needs for sky survey or other pointed observations.**
    - **Spitzer: mainly an issue for post-cryogen operations. Will have GLAST participation in the Spitzer Warm Mission Workshop 4-5 June**
- **Pulsar timing observations coordination work continuing (S. Thorsett, R.Romani, …)**
- **Many direct connections developed between LAT and other facilities. D.J.Thompson is LAT MW coordinator.**

Launch Outreach Preparations

- **Invitations: please contact Peter (LAT-related), Chip (GBM-related), or Steve (mission-related) with names of individuals who are not team members who should be invited to the launch.**
- **Starting launch outreach weekly telecons after Symposium**
- **Working on science visualizations and other support materials.**

First year source list

- **Solicit feedback on first year source list from the community**
  - **VERITAS**
  - **MAGIC**
  - **HESS**
  - **CANGAROO**
  - **Swift**
  - **Integral**
  - **MOJAVE**
  - **VIPS**
  - **Metsahovi**
  - **WEBT**
- **Emails send to these groups, requested feedback by March 1.**

We are writing to solicit feedback from YYYY on the GLAST LAT first-year data release plan.

GLAST is scheduled to launch in late 2007. For the first year, in addition to GRB alerts, the LAT will release energy-binned lightcurves (flux in energy bins as a function of time) for a set of sources. The set includes any source that flares above ~2e-6 ph cm-2s-1 (>100 MeV) until the source flux drops below ~2e-7 ph cm-2s-1, along with a stable list of approximately 20 monitored sources of interest to the community. Please see http://glast.gsfc.nasa.gov/ssc/data/policy/ for more details. A summary of the GI program may be found at http://glast.gsfc.nasa.gov/ssc/resources/library/info/GI_Program_Handout.pdf.

We are again reviewing the list of monitored sources to account for recent discoveries that may be relevant to this list and to make sure we include the sources of greatest interest to the wider community. Observations that require a GLAST trigger are particularly important.

In the first year, GLAST will perform an all-sky survey. In survey mode, the LAT will view the entire sky every 3 hours. Thus the LAT can provide evenly sampled lightcurves on all sources in the sky on timescales from hours to months. For source fluxes below the threshold for flaring source automatic data release, the LAT will provide sensitivity to variability typically on timescales of weeks down to days for some brighter objects.

We ask that you review the list and let us know if there are additional sources that should be added to the monitored list. Due to the impacts on both early mission planning and community mutliwavelength planning, we are looking for a few essential, additional sources rather than a large list of potential targets. While we welcome your feedback at any time, it would be most helpful to have a response (sent to both of us, please) by 1 March. The source list is vetted by the GLAST Users Committee and must also be made in consultation with the LAT PI, Peter Michelson, and the LAT team.

Please feel free to contact us with any questions or issues you'd like to discuss.

Thanks for you help,
Steve Ritz and Julie McEnery
for the GLAST Mission Team

Feedback Thus Far

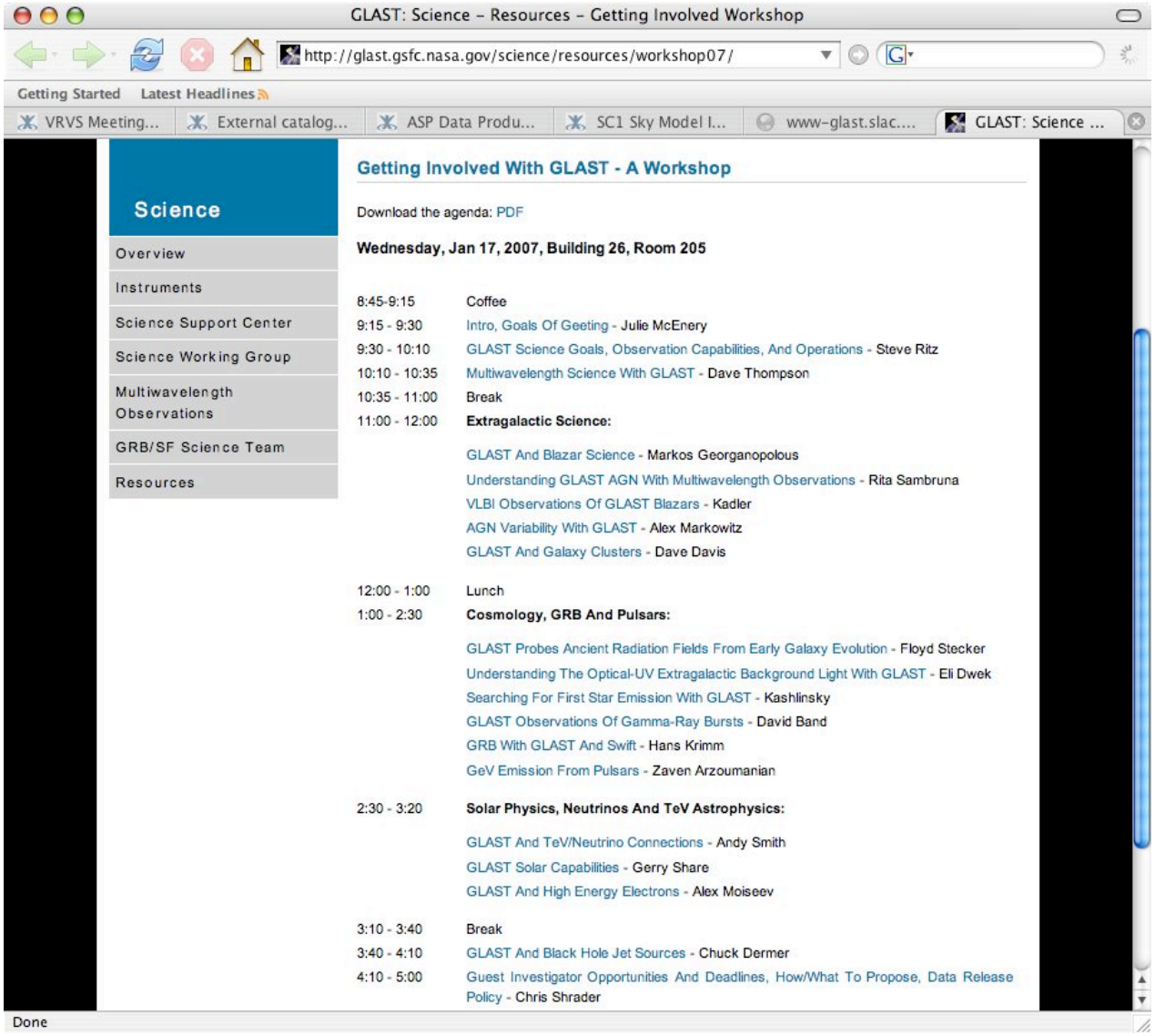
- **Margo Aller:**
  - Some of the objects that were radio-bright during the EGRET era are not exhibiting major radio flares now (0528+134, 1622-297, and NRAO 530).
  - Suggests adding
    - BL Lac
    - 0235+164 - high doppler motions, in radio bands historically shows well-resolved onsets
    - 4C 39.25 - an example of a source that based on its radio flux should have been detected, but was not.
  - 1959+285 and 2344+514 are weak but they can provide radio lightcurves. 1426+428 is below their confusion limit.
- **WEBT (Massimo Villata)**
  - WEBT have organised a radio-optical monitoring program to support GLAST and AGILE observations - "GLAST-AGILE Support Program" (GASP).
  - 28 blazars on their list, defined by EGRET flux and importance at lower energies. (http://www.to.astro.it/blazars/webt/gasp/list.html)
  - 8 high priority sources not on the GLAST list
    - 0219+428, 0235+164, 0716+714, 0735+178, 0851+202, 0954+658, 1156+295, 2200+420
    - Favored subset of this is: 0235, 0716, 1156, and 2200
- **Most of the others have replied saying that they would get back to us soon.**

GI workshop at GSFC

- On Jan 17 we held an informal workshop to get potential GLAST Guest Investigators in the DC area together.
- ~100 attendees from NRL, GSFC, UMBC, UMD (Physics and Astronomy), Johns Hopkins and STScI
- Talks on GLAST mission, multiwavelength opportunities, GI opportunities and data release plan in addition to a selected science topics.
  - Participants were invited to give short (5-10 min) contributed presentations.

- Very useful prototype for future workshops.

GI Workshop


GLAST: Science – Resources – Getting Involved Workshop
http://glast.gsfc.nasa.gov/science/resources/workshop07/
Getting Started
Latest Headlines
VRVS Meeting...
External catalog...
ASP Data Produ...
SC1 Sky Model I...
www-glast.slac....
GLAST: Science ...
Science
Overview
Instruments
Science Support Center
Science Working Group
Multiwavelength Observations
GRB/SF Science Team
Resources
Getting Involved With GLAST - A Workshop
Download the agenda: PDF
Wednesday, Jan 17, 2007, Building 26, Room 205
8:45-9:15 Coffee
9:15 - 9:30 Intro, Goals Of Geeting - Julie McEnery
9:30 - 10:10 GLAST Science Goals, Observation Capabilities, And Operations - Steve Ritz
10:10 - 10:35 Multiwavelength Science With GLAST - Dave Thompson
10:35 - 11:00 Break
11:00 - 12:00 Extragalactic Science:
GLAST And Blazar Science - Markos Georganopolous
Understanding GLAST AGN With Multiwavelength Observations - Rita Sambruna
VLBI Observations Of GLAST Blazars - Kadler
AGN Variability With GLAST - Alex Markowitz
GLAST And Galaxy Clusters - Dave Davis
12:00 - 1:00 Lunch
1:00 - 2:30 Cosmology, GRB And Pulsars:
GLAST Probes Ancient Radiation Fields From Early Galaxy Evolution - Floyd Stecker
Understanding The Optical-UV Extragalactic Background Light With GLAST - Eli Dwek
Searching For First Star Emission With GLAST - Kashlinsky
GLAST Observations Of Gamma-Ray Bursts - David Band
GRB With GLAST And Swift - Hans Krimm
GeV Emission From Pulsars - Zaven Arzoumanian
2:30 - 3:20 Solar Physics, Neutrinos And TeV Astrophysics:
GLAST And TeV/Neutrino Connections - Andy Smith
GLAST Solar Capabilities - Gerry Share
GLAST And High Energy Electrons - Alex Moiseev
3:10 - 3:40 Break
3:40 - 4:10 GLAST And Black Hole Jet Sources - Chuck Dermer
4:10 - 5:00 Guest Investigator Opportunities And Deadlines, How/What To Propose, Data Release Policy - Chris Shrader
Done