

Minutes for Fermi Users Group Meeting August 28, 2009

Attendees:

Luigi Piro, Chris Schrader, Scott Ransom, Wei Chi, Jamie Holder, Don Kniffen, Alan Marcher, Pat Slane, Alisha Soderberg, Peter Michaelson, Julie McEnery, Bill Paceisis, Bob Sodano, Rich Burns, Ilana Harris, Liz Hays, Elizabeth Ferrara, Eric Winter, Dave Davis, Michel Corcoran, Neil Gehrels, Robin Corbet

(other on phone)

Steve Ritz, Buell Jannuzi, Jim Ulvestad, Matthew Baring

Ilana:

- Fermi made the cover of Science Magazine. Made NASA administration very happy, strong support for Fermi right now.
 - Two new FUG members. Some current members will complete their tenure at the end of the year. Please send suggestions for new members.
 - New Program Executive, now over all missions except Hubble.
 - Cycle 2 complete, Cycle 3 will be discussed later.
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Julie:

- Introduces new Deputy Project Scientist, Liz Hays
- Operations continue to be smooth. Great FOT, excellent support to instrument teams.
- Several FSW updates on the LAT to address the reboots from the spring. All work complete and the problem should not recur.
- Collision avoidance: several planning exercises to rehearse the process.
- Looking for ways to improve fault management, monitoring reaction wheels

Question about risk analysis for micrometeoroids:

- No evidence of micrometeoroid damage. Many studies prelaunch regarding risk, and much mitigation done prelaunch.

Questions about COLA:

- Have you fired thrusters on orbit? No, the lines have not yet been wet. We don't want to do that unless necessary. This does feed into the decision process for making a collision avoidance maneuver.
- Fermi experienced a solar eclipse passage.
- Operations nearly all sky-survey. Have been balancing rocking angle with battery temperature.
- Interruptions to sky-survey are mostly due to ARRs.
- 5 days of downtime caused by processor reboots. Now fixed, should not recur.

Fermi science results are being cited in significant numbers. Significant follow-up science observations over many wavelengths to Fermi published results.

Battery performance:

Battery trend has been increasing temperature and decreasing pressure. This reduces battery capacity. Some capacity walkdown was expected, seen in SWIFT. We have some evidence that the pressure may be flattening. However the temperature is at the high end of the comfortable operating range. Most options for changing charging parameters are constrained by temperature. So plan is to modify the observing profile to reduce the temperature.

Increased rocking profile causes some loss of observing efficiency, increases background rate, decreases uniformity, but maintains full-sky coverage. Decrease in uniformity may not cause negative science impacts, but may trade the type of studies that can be done. 50 deg reduces efficiency by 3%. Sensitivity change caused by lower uniformity is significantly less than the fluctuations produced by the galactic background diffuse emission. Simulations show that background contamination after using the standard data selection is not affected by the change in rocking angle. Currently planning to change to 50 deg rocking angle on September 2nd. Will evaluate the performance and make decisions based on that evaluation.

Question (Don): Two possible reasons for this battery issue, will the result of this change be different?

- Assumption is that cooler battery is better, regardless. Whether we'll be able to disentangle the root cause is uncertain at this time.

Pat: Are there thermistors that can be used to evaluate this?

- Don't know. Using baseplate and cell temperatures, and they seem to be coupled.

Don: What is the most recent performance?

- Capacity versus time. Some indication of flattening of the capacity decrease, but not at all a stable performance.

Pat: Could the updated performance plots be circulated to the FUG?

- Many factors contribute to these results. It will require at least three months for the results to be useful.

LAT team activities:

Revisions to the Instrument Response Function to account for "pile-up." This effect is background-dominated. Corrections provided to the user community with the recent science tools release. Ultimate correction continues to be worked and will be provided once analysis is complete. Catalog development on 11 months of data is ongoing and will be released before the Fermi Symposium. Significance threshold will be lower than that given in the Bright Source List. Diffuse model has been provided. It is not GALPROP. Also an isotropic component to the background is provided. Combining these will give correct results. GBM is providing a burst catalog. Currently meeting the localization requirements.

Due to some launch cost carryover, not all grants will be fundable. Plan to fund most grants, and postpone others. Will plan for this next year. What is the right approach? Had partly complete funding when we realized the issue. Then we excluded anyone at a NASA center. Then anyone who was getting multiple grants received only one of two. Finally, asked instrument teams to

wait if possible. Resulted in only a few grant simply remaining unfunded.

Alan: If you can communicate the start date to the institution, the PI may be able to spend the money through the University before the money has been provided.

Scott: Depends on the PI. You should just ask the PI if they can wait for their money.

Question: If you can split the grant and provide some now and some later? Ilana: Cannot do that at this time.

Jamie: Perhaps include a request beforehand? Chris: Plan to add it to the selection letter. Alan: Just maintain communication.

Don: Radical suggestion - Chandra's solution was to sub the process out and reduce bureaucratic overhead by replacing the NSSC. They can react faster once you know what the issue is.

Bill: Subcontracts for co-I money will be even more delayed. Something to consider in selection.

GCN status:

9 GRBs detected by the LAT. 3 bright enough to cross the on-board threshold. Reviewed the remainder and believe the others could not have been detected autonomously. 2 were received prior to enabling LAT GCN notifications. So since launch there has been only one LAT GCN notice. LAT bursts have different properties than expected, so the autonomous GRB searching may never do better. Recently added a GCN notice to indicate when Fermi has responded to a repoint request from either the LAT or GBM.

Peter:

Science Operations:

LAT continues to perform well. Some ongoing calibration activities. ISOC is in routine operations, with pipeline processes running well. The year 1 data release is complete and ongoing data delivery is much better than the required 72 hours. New event classes may be added as a result of ongoing calibration. If significant new results are published using a new (non-public) class, best effort will be made to update the public archive with the new classification. It takes about 1 month to redeliver 1 year of data.

Science Results:

Many types of sources being detected. Wide FoV and sensitivity is contributing greatly to AGN and GRB studies. A Bright Source List released in February to support the Cycle 2 proposal efforts. Soon the 1-year catalog, based on 11 months of data, will be released with many more sources. Fermi confirmed all the EGRET pulsars, found many pulsars using radio ephemerides, and many new gamma-ray pulsars from blind searches. Two of the latter have now been detected in the radio. The blind search pulsars and millisecond pulsars have been published in a recent issue of Science. LAT detects 47 Tuc, which contains 23 of these ms pulsars, and these results are in the same issue of Science.

Early AGN detection of 3C 454.3. LAT routinely reports light curves for similar objects at the FSSC site. These results are triggering multiwavelength campaigns across much of the EM spectrum. 9 LAT GRBs, with redshifts for 4 of them. 2 were short-duration bursts. First time we can study fine structure at high energies. Spectral fitting to band functions shows evidence for spectral evolution. LAT observations of intermediate latitude have shown the GeV excess in

background emission seen by EGRET is not confirmed. CR electron/positron spectrum is most cited reference. Accuracy of spectrum is primarily due to the fact that the thin calorimeter can image the shower, allows for good reconstruction of these high-energy events. Initial publication of the spectrum was too brief for a good explanation. An upcoming publication will discuss this in more detail, with more data included, as well as an extension to lower energies.

Jamie: Can Fermi do the moon shadow experiment to measure the CR background? Peter: Have to think about this.

Lynn:

Introduces the NASA education pyramid. For inspiration, there is the facebook, cafe press, GLASTcast videos, and 100 hours of astronomy site. Weekly episodes on various objects have been distributed by the Night Sky Network clubs. An example is shown. Translated into Spanish, French and Italian. Space Mystery - Galactic Doom is in evaluation. Podcast on 365 Days of Astronomy will air on Sept. 16th.

Exhibits/Workshops:

Traveling exhibit in the SF Bay Area, likely seen by 100k people. Library exhibit created with the Smithsonian, displayed in unusual locations, often accompanied by talks from Educator Ambassadors. Workshops at Satellite Educators Association, first time adding astrophysics to this conference. AGN-oriented educator workshop held at Goddard to give teachers opportunity to work with real data.

School outreach at Roseland University Prep, two MESA clubs, and MESA Engineering Program at SSU.

Products: New Fermi Race game for all Fermi Symposium participants. Has been played with 8-10 year olds with great success. GTN website approved. Need evident for simplified calibration pipeline, so worked on that this summer. Results go into the AAVSO website. Fermi now has an approved lithograph, as well as the launch fact sheet. New Fermi stickers and Fermi paper model have been ordered, and will be available for the symposium.

Geo-dome: Working with GSFC to develop show for portable planetarium. Projection is good enough for images, and should be good enough for this presentation. Supporting documentation is already in place. Will travel around to museums, etc. in the DC area. Black Hole show permanent license is \$5000, and would be a one time cost. Should this be done? Alan and Julie agree that it's a worthwhile expenditure.

Press releases and public lectures at the rate of about one per month. Science cover for Aug. 17, 2009. October will be a first-year results press conference (1-year sky map, catalog, HMXB, GRBs, etc.). Want to expand WWT and Google Earth content. Need more awareness about posting results to astro-ph before the press conference can be held. Public lectures should be documented as well, though educator outreach is best.

Bill P.:

GRB burst rate seems reasonably constant. Large peaks are soft gamma-ray repeaters, and additionally some terrestrial gamma flashes have been seen. 14 seen in the first year. A few events have been electron events, whether local or distant. Analysis of three short hard bursts is being investigated. Spectral evolution is similar to longer bursts. Hope to submit this result soon.

TGFs are of high interest to the atmospheric community. Several events appear to be associated with lightning. Others are not, and analysis is ongoing. Events are very short and very bright. high rates indicate significant deadtime. Correcting for this implies incredibly high rates on extremely short timescales. Occasionally, detection is only on one side of the spacecraft, and may be a direct electron detection.

Earth occultation monitoring. Not as sensitive as BATSE except at very low energies. In principle better than BAT at high energies. Difficult to do because of the observing style and mounting locations. Making progress.

Pulsed source monitoring is ongoing. Recent publication of detection of switch from spin down to spin up of pulsed source. GBM detected spin up and then filled in the gap with BAT data to identify the inflection point.

Upcoming FSW revision will add TGF trigger algorithms. New algorithms use the BGO detector for the first time in the triggers. Also will increase ARR decision information to the TRIGDAT packets to allow for rapid analysis of ARR request. Ground software updates will allow GCN notices from human analysis.

Question: Are you making light curves available for interesting sources?

- Yes, there is a website with the light curves available. Should be in previous meeting charts.

Question: Will the GBM have a human-in-the-loop person available to the community?

- Not currently, but the GBM does not have any sub-threshold bursts. If you have the position available, all the data we would use is already available from the FSSC. We don't currently have code that would search the data in the same way as the flight code.

Question: How do you tell if the burst is in the LAT FoV?

- Included in the GCN notice, but yes, adding it into the table would be useful.

Liz:

What works: MOUs continuing to be developed, most recently with Pan-STARRS. Upcoming IceCube and LIGO agreements. Coverage has been good in multiwavelength followups from LAT announcements. Doing well communicating pulsar info with radio observers, and AGN flares to the general community. Working to get coverage of detected binaries. Now seeing new

classes in the LAT data; starburst and NLS1 galaxies. Diffuse models rely on multiwavelength data.

Publicly released data has already shown results outside the Fermi mission. Plan to continue public announcements of sources of interest, as well as informal communication. Top-level summaries available now on the Fermi Sky-blog. Now that data are public, desire is to combine experience with other observers. Do please not the data caveats when using LAT data.

Also, observers are strongly encouraged to record ongoing MW campaigns!!

Question: Who is the go-to person for the LAT data?

- There is a Science Support Center. Use the helpdesk there for analysis. If the desire is for collaboration, Dave Thompson is the multiwavelength coordinator. Many of the GI programs are correlated MW observations, so there are lots of people.

Chris:

Data release was a major milestone. Hundreds of queries at this point, plus the all-sky files. Science tools release is going smoothly, with very few helpdesk requests. Still upcoming are a Fermi plug-in for tempo2 analysis, and a GBM analysis routine that allows interactive background fitting.

Question: What is the data release timescale?

- Days

Alan: Are there available scripts that can be used for automating analysis. Examples would be nice to be able to see syntax.

- That has been delayed until the next release. That date has not yet been decided.

Analysis Workshops: first scheduled for Oct 1. Want to limit the numbers to facilitate 1-on-1 interaction.

Question: What about summer program for grad students?

- It's being considered.

Need to leave the meeting with guidance on these analysis venues. Previously have been DC, Boston, Chicago, Bay area, and LA.

Alan: Suggest looking at the locations for the GIs.

- Is it helpful to hold close to AAS meeting? Or perhaps the APS meeting?

Ilana: APS would bring an entirely new community.

Question: Can you send a wide notice to lists and ask what the interest would be?

- That would help pick up those smaller university groups know and communicate their interest.

Steve: What is the timing on these workshops? Can we do 2-3 of these before the end of the year?

- Should be about 1 a month. 2 is realistic. Querying the community will help.

Alan: How many personnel need to be involved? Can this be done virtually? Do you need to travel?

- For 25 people, 5 people should be enough. The virtual idea is appealing. We'll discuss that internally.

Pat: This early, if it were decided it was easier here, I bet you'd get people willing to travel to get that experience.

Steve:

Second bulletin out with updates. Sent to the Fermi News list, but not yet sent to those who have expressed interest in in the symposium. Will work with the FSSC to determine what level of support will be present, prior to sending the next bulletin.

Question: Is there going to be press? Is there a way for people to indicate when they think they have press-worthy results?

- Lynn will review the abstracts, but we can add a button for people to indicate if they think their contribution is press-worthy.

Reminder: There will be no printed proceedings. Only a short form booklet will be printed. Full abstracts will be on the web, as well as on flash drives to be handed out.

Question: With the high cost, is there financial support for students?

- No student rate. If students need assistance, we will have to see based on by-need basis. But how much can be done is dependent on the number of full-cost attendees.

Suggestion: Poster prize for grad students or post-docs has been a very good incentive. Part of the prize could be an oral presentation. Can be done as first, second, third or as one per major topic.

- That's something to consider. Would need to find people to be judges.

- If people request their poster be included, that can cut the amount of work. Also would require that it be a student or post-doc as presenting author. Judges would need a recognizable mark to indicate inclusion in the competition.

Peter:

First evening of the symposium is a concert event at the Kennedy Center. All attendees plus guests will be invited. Program includes American Brass Quintet and Boston University Symphony. Premier of Cosmic Reflection, a new symphony based on cosmic themes. A brief recognition of the Fermi Science Ambassadors will be included. The event is free, though there are details associated with that. Seating for 2400 people. Outreach to schools in the area.

Alan:

AAS meeting. What is being planned?

Julie: No proposals for special sessions. Likely will be many contributed talks that will be

collected into Fermi sessions. The last couple meeting where we self-organized into sessions seems to have worked well.

Chris:

Gamma-ray astronomy is a different beast; smaller community, different data collection rates. This is a reasonable number for an instrument of this type, with this observing strategy. Cooperative arrangements with NOAO and NRAO. NRAO was well-requested, but NOAO was significantly under-requested.

Alan: For the multi-year projects, was there a consideration of reducing the size of the project?

- No, the decision was made not to do that. I would discourage submitting multiple proposals.

Alan: Can some communication be made for that?

- That was very clear. Nothing prevents them from including that information in the proposal.

Panel was instructed to consider the proposal only as what it is considered. If the proposal is a true large project, it shouldn't be something that could be cut to a single year.

- Cycle 3 wording will state approximately 3 large proposals

- Should we cut large proposals?

- There are projects that definitely require that much time. Anything that requires hiring a post-doc becomes a large proposal.

No major issues with inappropriate proposals. May be more helpful to clearly state the instrument team obligations. In some cases, the review boards feel that certain activities are instrument team obligations, while remaining unfunded. We need to be clear to the panel chairs what the funded obligations are for the instrument teams.

Progress reports were hard to be sure how to handle. What do we want from this? Progress reports were being read by unbiased reviewers. Having the feedback from the panel is helpful to us, and carried weight with the proposer. It was a bit confusing for the panel. However, if the review was useful, it seems reasonable to continue.

Cycle-3: AO will need to go out early December. ROSES are asking for 90 days from announcement to deadline.

It would be nice to shift it to move it away from the Chandra deadline. Also, be aware, AAS Head meeting March 1-4. So early February seems good.

Alan: Evaluation - add a comment about pointed observations to point 3?

What else affects mission resources? Nothing offhand...

Question: Is the rule against funding foreign collaborators going to continue?

Ilana: No NASA money should be spent outside the US.

General discussion:

Jim email: Helpful for NRAO to get an approved source list. It's helpful for when there are two PIs who have the same object.

Need to communicate better. Understanding can be that if a proposal got time, all targets are approved unless notified of a change.

Buell: NOAO - One telescope availability has changed, so the webpage needs to be updated.
Chris: Send me an email.

Alan: Impression that the Fermi staff is very knowledgeable, and working very hard toward success. You are to be congratulated. NASA HQ is helping things along. Sandy is very responsive. It's an extremely well-run operation.

Julie: We value the input from the User's Group to ensure we are providing for the needs of the community.

Alan: Timing for the next meeting. Do we want/need two F2F meetings per year? Should we make the next meeting a telecon? Can we have it at the AAS meeting?

- Next one should be F2F.

Alan: So make winter a F2F and then decide if we move to annual cycle? What should the timing be? February 23? After the proposal deadline, at Goddard. There will be a telecon in between? How about a meeting at the symposium. (Agreement) Thursday afternoon? Let Fermi project complete those plans.

Julie: I have a few action items...

- Budget request will request input on timing of funding
- Link the GBM light curves
- Make sure theta is added to the GRB table
- Mention skyblog on announcements
- MW observation page
- Add GBM info to the blog
- Send email about regional workshops, request feedback for numbers and regions
- Organize virtual workshop with limited number of attendees
- Add button to abstract for press-worthy
- Consider adding a poster prize to symposium