Division Personnel Changes

Departures

• Nov 30, 2012  Michael Moore retired after 32 years with NASA.
• Feb 8, 2013  Ilana Harrus completed her IPA assignment to accept a position at the NSF.

Arrivals

• Jan 3, 2013  Tony Carro arrived on detail from the Planetary Science Division to be the Exoplanet Exploration Lead PE and Kepler PE.
• Jan 3, 2013  Debra Wallace started her IPA assignment and is leading the Fellowships programs and helping on ADAP and Archives.

Transitions

• William (Billy) Lightsey is the Division Technology Lead.
• Michael Garcia is the APRA Lead and Swift PS.
• Lou Kaluzienski is the Fermi PS.
• Lisa Wainio is the Public Affairs Lead.
• Keith MacGregor is the ATP Lead.
The Big Picture.....

• This is a time of opportunity for NASA Astrophysics
  - The total Astrophysics budget is at a high level.
  - Large and small space-based observatories spanning the electromagnetic spectrum are currently studying the universe.
  - The James Webb Space Telescope, the highest priority of the community, is on schedule for an October 2018 launch.
  - Astounding suborbital-class investigations are being conducted on sounding rockets, balloons, and the International Space Station.
  - Individual investigators are leading data analysis, theory, and technology development projects selected through open, competitive, peer reviewed solicitations.
  - We are preparing for the strategic mission that will be developed following JWST.

• The budgetary future is uncertain
  - “If you can’t live with uncertainty, please don’t come to work at NASA Headquarters.” (Paul Hertz, quoted in Space News, 2012 Nov 11 issue)
NASA Astrophysics Budget:
FY07-FY12 Appropriated and FY13-FY17 Proposed

Real Year $Million

JWST Program Office
Astrophysics Division
FY2013 President’s Budget

Total FY13 Budget (excluding JWST)* $649M

- Astrophysics Research includes:
  - R&A Programs (APRA, ADAP, ATP, OSS, RTF, TCAN)
  - Research Support: Balloon Program, Astrophysics Data Archives, Senior Review Wedge

- Cosmic Origins includes:
  - Hubble, SOFIA, Herschel, Spitzer, technology development

- Physics of the Cosmos includes:
  - Chandra, Fermi, Planck, XMM, LPF, Euclid, technology development

- Exoplanet Exploration includes:
  - WFIRST, Kepler, Keck Ops, LBTI, technology development

- Astrophysics Explorer includes:
  - Astro-H, NuSTAR, Swift, WISE, WMAP, Suzaku, GALEX, EX-1 and EX-MO, future Explorers

* Final funding levels pending an FY13 appropriation by Congress and the concurrence of Congress on NASA’s initial FY13 operating plan
Astrophysics Research Awards

Most recent competitions:

<table>
<thead>
<tr>
<th>Program</th>
<th>Proposals Rec'd</th>
<th>Year-1 $M</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTF-11</td>
<td>16</td>
<td>0.6</td>
<td>19%</td>
</tr>
<tr>
<td>APRA-11</td>
<td>162</td>
<td>12</td>
<td>27%</td>
</tr>
<tr>
<td>SAT-11</td>
<td>48</td>
<td>8</td>
<td>21%</td>
</tr>
<tr>
<td>ADAP-12</td>
<td>291</td>
<td>9</td>
<td>31%</td>
</tr>
<tr>
<td>OSS-12</td>
<td>46</td>
<td>2</td>
<td>26%</td>
</tr>
<tr>
<td>ATP-12</td>
<td>181</td>
<td>4</td>
<td>15%</td>
</tr>
</tbody>
</table>

Split of $82.562M spent in FY12
PI Award programs plus management overhead
Astrophysics R&A Funding Trends

Funding (in $M) for the fiscal year (n.b. awards funded in year N were selected in year N-1):

<table>
<thead>
<tr>
<th>Year</th>
<th>ATP</th>
<th>APRA</th>
<th>ADAP</th>
<th>Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$11.9M</td>
<td>$45.1M</td>
<td>$14.4M</td>
<td>$74.8M</td>
</tr>
<tr>
<td>2009</td>
<td>$12.3M</td>
<td>$44.6M</td>
<td>$13.3M</td>
<td>$73.9M</td>
</tr>
<tr>
<td>2010</td>
<td>$12.6M</td>
<td>$44.1M</td>
<td>$14.1M</td>
<td>$73.9M</td>
</tr>
<tr>
<td>2011</td>
<td>$12.6M</td>
<td>$44.1M</td>
<td>$14.1M</td>
<td>$82.5M</td>
</tr>
<tr>
<td>2012</td>
<td>$11.8M</td>
<td>$50.6M</td>
<td>$16.4M</td>
<td>$82.5M</td>
</tr>
</tbody>
</table>

* includes other R&A elements in addition to ATP, APRA, ADAP

- **ATP (Theory)**
- **APRA (Research and Analysis)**
- **ADAP (Data Analysis)**

Percentage of proposals selected (solid line)
Number of proposals received (dashed line)
<table>
<thead>
<tr>
<th>Program</th>
<th>Proposal Due Date</th>
<th>Notify Date</th>
<th>Days since received</th>
<th>Number received</th>
<th>Number selected</th>
<th>% selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astrophysics Theory Program</td>
<td>Jul 13</td>
<td>Dec 6</td>
<td>146</td>
<td>181</td>
<td>28</td>
<td>15%</td>
</tr>
<tr>
<td>Euclid Science Team</td>
<td>Aug 31</td>
<td>Nov 7</td>
<td>68</td>
<td>8</td>
<td>3</td>
<td>38%</td>
</tr>
<tr>
<td>Swift Guest Investigators</td>
<td>Sep 26</td>
<td>Dec 18</td>
<td>83</td>
<td>158</td>
<td>45</td>
<td>28%</td>
</tr>
<tr>
<td>Nancy Grace Roman Technology Fellowships</td>
<td>Nov 8</td>
<td>[1]</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Fermi Guest Observer</td>
<td>Jan 18</td>
<td>[3]</td>
<td></td>
<td></td>
<td>233</td>
<td></td>
</tr>
</tbody>
</table>

[1] Peer review in January
[2] Peer review in April
[3] Peer review in March
New Opportunity: TCAN
Theory & Computational Astrophysics Networks

• Astro2010 recommended that NASA, NSF, and DoE jointly provide awards to Theory and Computation Networks that address major theoretical questions raised in Astro2010 that are ripe for a breakthrough.

• **Theoretical and Computational Astrophysics Networks (TCAN) is a joint program with NSF.**
  - The text of this solicitation can be found on the NSF web page at http://go.usa.gov/Yehz
  - Information for NASA proposers is in Appendix D.12 of ROSES-12.
  - All proposals must be submitted via NSF's FastLane at https://www.fastlane.nsf.gov/
  - Proposers and their institutions must be registered in FastLane for proposal submission.

• **The window for proposal submission on FastLane opens on February 1, 2013 and closes on February 14, 2013 at 5 pm local time for the proposer.**
  - The NASA point of contact for TCAN, Joan Centrella, can be reached at Joan.Centrella@nasa.gov or (202) 358-2522.
  - The NSF point of contact for TCAN, Thomas Statler, can be reached at tstatler@nsf.gov or (703) 292-4910.
• 2-year Prime Mission started Aug 1, 2012.
• Early pointing and alignment issues have largely been mitigated.
  - Unexpected thermal displacements of both the star tracker camera head units and mast structure.
  - Initial alignment of star cameras was off by ~4mm instead of the planned 1mm.
• Science observations proceeding well.
• NuSTAR working with other missions for coordinated observations (e.g., viewing 3C273 along with Chandra, XMM-Newton, Swift, Suzaku, and INTEGRAL).
• Multiple results reported at AAS including:
  - Cas A: 10-30keV images constrain shock acceleration
  - ULXs: high energy spectra imply super-Eddington accretion
JWST 2012 Progress

- 2 of 4 flight instruments delivered
- Other 2 instruments in cryo-vac testing right now, delivery this Summer
- 3 primary mirror segments and secondary mirror delivered
- All Aft Optics System testing completed
- 3 of 5 engineering template sunshields complete, 1 nearly complete, 1 being assembled
- Modifications to JSC chamber A completed and test objectives met
- Ground and air transport container for Observatory delivered

On Schedule for October 2018 launch
Integration of the JWST Integrated Science Instrument Module (ISIM) Is Well Underway

ISIM Structure

Space Environment Simulator Chamber at GSFC

ISIM Electronics
• Announced additional 461 planet candidates (61 HZ candidates of all sizes, including one super-Earth around sun-like star) at AAS.

• Completed Quarter 15 Month 3 Science Data download.

• Elevated friction on wheel 4 seen in X-band on January 7.

• After observing persistence of elevated friction, wheel placed in rest position for 10 days starting January 17.

• Reaction wheels restarted on January 27, less than 1 hour spent in low speed state.

• Returned to science mode on January 28.

• Next Ka band downlink scheduled for March 6.
  - Will determine status of elevated friction on wheel 4 at that time.
• Completed Avionics Check Flight #4 on Jan 14.
  - Demonstrated that the remaining significant avionics anomaly (2 Hz yoke chatter) has been fixed.
  - Performed observatory Verification and Validation (V&V) flights on Jan 23.
  - Installation of upgraded Focal Plane Imager (FPI) has begun.
• Released two FORCAST mid-infrared images of galactic center at AAS Winter Meeting.
• Cycle 1 Science scheduled for May-Dec 2013.
  - First Cycle 1 science flight is now scheduled for May 4, a Pluto occultation observation using HIPO.
  - Includes Southern Hemisphere deployment to New Zealand.
• Delayed completion of avionics upgrade / check flights challenges completion of Cycle 1 science in 2013.
Program Update - Astro-H

- Feb 18-22: Engineering and Science Team meetings at Tsukuba, Japan.
- NASA flight model hardware fabrication is on track.
- NASA detector verified to have ~5eV resolution (7eV requirement). Detector was cooled to 50 mK using method developed in lab at GSFC as work-around to failed heat switch.
- Severe issue with JAXA cryocoolers identified. Cryocoolers produce microphonics that induce heating in the NASA microcalorimeter detector which degrades the resolution to ~ 60 eV. (Requirement = 7eV) JAXA is working redesign of cryocooler suspension system.
- JAXA schedule under review to accommodate resolution of these issues.
Antarctic Campaign 2012-2013

**Super-TIGER (R. Binns, WUSStL)**

**BLAST (M. Devlin, U Penn)**

**EBEX (S. Hanany, U Minn)**
The E and B Experiment, measure the intensity and polarization of the cosmic microwave background. Launched Dec 28, 2012; landed Jan 23, 2013; recovery underway Jan 30, 2013.
Astrophysics on the ISS: A Cosmic-ray Observatory

AMS Launch May 16, 2011

ISS-CREAM Sp-X Launch 2014

CALET on JEM HTV Launch 2014

JEM-EUSO Launch Tentatively planned for 2017
The ESA and NASA have signed the MOU in January 2013.

NASA’s portion of the project approved to enter Phase B on Dec. 21, 2012.
- NASA is providing the flight sensor chip subsystems (SCS or triplet) for the Euclid NISP instrument; SCS consists of H2RG sensor chip subassembly, SIDECAR ASIC, and flex-cable
- NASA Euclid project is at JPL
- Characterization of SCS will be done at GSFC
- NASA Confirmation is planned for late Summer 2013

NASA has selected 3 proposals for Euclid science investigations
- ESA has appointed Jason Rhodes (JPL) to the ESA Euclid Science team. This confirms NASA’s selection and nomination.
- NASA has nominated to ESA 40 members of the Euclid Consortium and Jason Rhodes to the Euclid Consortium Board. The Euclid Consortium has approved all of NASA’s nominations in January 2013.
  - Precision Studies of Galaxy Growth and Cosmology Enabled Through a Physical Model for Nebular Emission
    - PI R. Chary (Caltech), 3 members
  - Looking at Infrared Background Radiation Anisotropies with Euclid
    - PI A. Kashlinsky (GSFC), 7 members
  - Constraining Dark Energy and Gravity with Euclid
    - PI J. Rhodes (JPL), 36 members (+ some current EC members)
WFIRST Science Definition Team (SDT) delivered its final report in August 2012

- First Design Reference Mission (DRM1) is a proof of concept that a mission can be constructed that is compliant with the Astro2010 recommendation. [1.3m mirror, current technology detectors, 5 year mission]

- Second Design Reference Mission (DRM2) does not duplicate capabilities of Euclid, LSST, and JWST in advancing science objectives of WFIRST and looks for cost savings. [1.1 m mirror, evolved technology detectors, 3 year mission]

- SDT report shows that (a) DRM1 is fully responsive to the objectives of Astro2010 and (b) DRM2 offers a low-cost near-IR survey opportunity, but the limited 3-year life precludes full compliance with Astro2010 goals.

Astrophysics Focused Telescope Assets (AFTA) SDT studying use of 2.4m telescope assets for advancing the science objectives of WFIRST

- See next slide

WFIRST Study Office at GSFC is continuing to revise DRM and study trades

NASA is investing in evolved detector technology through the competitive SAT program

- Enable the continued maturation of the H4RG-10 near-IR detector array to TRL-5
- Achieve HgCdTe detector design/process improvements that will benefit WFIRST and other applications

http://wfirst.gsfc.nasa.gov/
Astrophysics Focused Telescope Assets (AFTA) Study

• Seven month study planned to assess the use of the 2.4m telescope to implement an Astro2010 mission to accomplish the WFIRST science.

• Science Definition Team formed to support study activities.

• Decisions made by SDT as of November 30, 2012.
  - GEO orbit (baselined, but pros and cons still being discussed by SDT members).
  - 3 x 6 array of H4RG10 detectors.
  - Grism (not prism) for the spectrograph.
  - Diffraction limited at 1.2 micron (versus 1.0 micron in prior DRMs).
  - Coronagraph will be a Lyot with a shaped pupil mask.
  - Cut down baffling so obscuration will be 30% instead of the current 40%. This is being done for the coronagraph instrument.

• SDT face-to-face meeting held in conjunction with AAS Meeting in Long Beach on Jan 10-11, 2013.

• Preliminary findings are that science increase over WFIRST DRM1 and DRM2 is substantial.
In June 2012, NASA announced that it had acquired the use of two sets of 2.4m space-qualified telescope optics systems and supporting components.

Although their most obvious applications are in astrophysics, NASA is interested in identifying possible uses for these systems to address a broader range of its science, exploration, and technology goals.

- In November 2012, NASA released an RFI soliciting broad community inputs focused on utilization of the telescope assets for Agency goals in space technology, human exploration and operations, heliophysics, planetary science, and astrophysics (excluding a wide field infrared survey).
- A workshop was held February 5-6, 2013, in Huntsville AL to provide a forum for concept presentation and discussion of innovative ideas.
- Astrophysics concepts included UV/Visible observatories, exoplanet observatories, solar system observatories, time domain observatory, deep imaging observatories, exo-ecliptic observatory, binocular observatory, balloon borne observatory, etc.
- This will be followed by additional study by NASA of representative concepts presented at the workshop.

NASA will use all of the information gathered to formulate and evaluate future strategies for utilizing the assets to advance Agency goals.

- A final study report will contain the workshop briefings and the results of follow-on analyses. This report will be completed about May 2013 and publicly released thereafter.

http://science.nasa.gov/salso/
Explorer Program

- The Astro2010 Decadal Survey stated that “NASA should support the selection of two new astrophysics MIDEX missions, two new astrophysics SMEX missions, and at least four astrophysics MoOs over the coming decade.”

- The Astrophysics Explorer budget has been significantly augmented to enable selection of 4 PI-led missions and 4 PI-led Missions of Opportunity (MOs) over a decade.

  - NASA will downselect in Spring 2013 one mission and one MO from the projects currently conducting Phase A studies (FINESSE/TESS, GUSSTO/NICER).

  - NASA will select in Summer 2013 one (or more) MO from the proposals received in December 2012.

- Astrophysics Division is planning a series of AOs (subject to budget approval):

  - An AO for a SMEX in late-2013/early 2014 with the cost caps and dates TBD (no MO call in this AO – the late 2012 MO solicitation was the associated MO call).

  - An AO for an EX and MO in 2015.

  - AOs, each for a mission and MO, will be approximately 2.5 years apart (4 per decade), subject to budget availability.

To be downselected in Spring 2013

To be selected in Summer 2013

SMEX AO in 2013/2014

More Explorers in here; depends on budget

WFIRST?
Backup
Funding Opportunities in 2013

- **ROSES-13 is currently planned for release on February 14, 2013**
  - Delay in release of the President’s budget may cause a delay in the release of ROSES-13
  - All solicitations are subject to availability of budget; the President’s FY13 budget request (not yet appropriated by Congress) includes a 1.8% increase for R&A
  - Caveats: No FY13 appropriation, possible sequestration, no FY14 budget request

- **ROSES-13 will include the usual Astrophysics R&A and GO solicitations:**

- **Due Dates will be about the same time as last year. Upcoming 2013 due dates:**
  
  - January 18, 2013  Fermi Guest Investigator -- Cycle 6
  - January 18, 2013  Kepler Guest Observer -- Cycle 5
  - February 14, 2013  Theory and Computational Astrophysics Networks (via NSF FastLane)
  - March 1, 2013  Kepler Participating Scientist Program
  - March 22, 2013  Astrophysics Research and Analysis: APRA-12
  - May 17, 2013  Strategic Astrophysics Technology: SAT-12
  - May 23, 2013  Astrophysics Data Analysis: ADAP-13
  - September 26, 2013  Astrophysics Theory Program: ATP-13
  - November 1, 2013  Swift Guest Investigator -- Cycle 10
  - November 1, 2013  Nancy Grace Roman Technology Fellowships for early career researchers (RTF-13)