

## JCSA Meeting Report June 2014

The JCSA met on June 13, 2014 following the CASCA meeting at Universite Laval, 2165 Pavillion d'Optique-Photonique in Quebec City. Laura Parker, J.J. Kavelaars, David Lafreniere, Peter Martin, Gary Hinshaw, Jean Dupuis, Denis Laurin (co-chair), and Brian McNamara (co-chair) attended. Andrew Cumming was absent. Guests included: Michael Hudson, Luigi Gallo (by Skype), John Hutchings, Marcin Sawicki, Rene Doyon, Alain Ouellet (by telecon), Oliver Daigle, Alan Scott, Fredrick Grandmont.

The meeting began with a discussion of NEOSsat. NEOSsat achieved orbit and is apparently able to point, but otherwise it is not working properly. Engineers are attempting to fix the problem in an effort expected to continue for a few more months. A full report on its status should be forthcoming at the next JCSA meeting.

The CSA announced the successful conclusion of the MOST mission on April 30. The JCSA was informed that the satellite will be placed in safe mode in September 2014, while science funding continues until February 2015. The CSA is willing to return the satellite to operation if outside funding can be found.

The committee expressed its concern to the CSA that it was not informed of the decision by the CSA, but instead learned of it through the press. The committee asks the CSA to keep it abreast of major announcements concerning missions of interest so that the JCSA is able to inform CASCA and the astronomy community in a timely fashion. Denis Laurin and Jean Dupuis agreed.

Denis Laurin briefed the committee on structural changes at the CSA and on the CSA's Canadian Space Exploration Plan (CSEP), in light of budgetary realities. The JCSA briefly discussed its responses to the CSEP questionnaire. Denis discussed the Request for Information (RFI) concerning WFIRST that was released earlier in the year. He reported that eight responses to the RFI were received as of the June 20, 2014 deadline, and that the responses are being studied. AOs for Phase 0 studies for CASTOR and SPICA are planned for release later this Summer or Fall. The committee expressed interest in JAXA's LiteBIRD polarization mission and will seek an update on its status at its next meeting.

Due to time constraints, a discussion of the CSA's Balloon program among others will be tabled until next meeting.

Mission reports are discussed in turn:

### **ATHENA/Gallo**

Luigi Gallo, attending by Skype, discussed the status of the ATHENA+ X-ray mission. "The Hot and Energetic Universe" was selected by ESA in November 2013 as the theme for its next L-class mission. Apparently, ATHENA+ was the only mission concept submitted in response to the call, and a decision to move ahead is expected in Summer 2014. Luigi Gallo summarized the science driving the mission and

## JCSA Meeting Report June 2014

outlined potential opportunities for Canadian participation. ATHENA+ is a ~1.4B Euro project with international participation limited to <20% of total expenditures. Gallo suggested several potential contributions including, warm electronics for the calorimeter imager, metrology, and calibration. Gallo was questioned about the Canadian science community's return on investment, and he responded that the issue remains open.

### **ASTRO-H/Gallo**

Thermal vacuum testing of ASTRO-H CAMS has shown that the laser is unstable to thermal cycling. The issue was identified at CDR, but was attributed to the test bench and not the flight instrument itself. The problem instead is with the support structure of the laser collimator, which was apparently not built to design specifications. Three redesigns are being examined. Fixes and projected delivery dates for each, currently Oct. 2, 14, 27, 2014, are approximately one month behind delivery schedule. The dates are optimistic. Despite the rework, Gallo reported that the proposed rework are unlikely to get CAMS to spec and may require a calibration work around. Worst-case scenario: CAMS doesn't fly.

Calibration specialist Casey Lambert has left the project for a permanent position elsewhere, and it is unclear how calibration will proceed in future. Casey's data analysis and reports were delivered to the US Science Calibration Team. The CSA currently has no expertise or manpower in this area. Hutchings offered the possibility of contributing NRC manpower toward calibration.

Other issues: a Letter of Agreement between JAXA & CSA includes no support for CAMS following delivery. JAXA has requested a meeting at SPIE Montreal, but the CSA has apparently not responded to this request.

### **WFIRST-AFTA/Hudson**

Mike Hudson serves as Canadian member (ex-officio) on the Science Definition Team for WFIRST-AFTA. The flagship dark energy mission uses the combination of weak lensing, baryon acoustic oscillations, and supernovae to explore the evolution of dark energy in the universe. It also has an exoplanets science component involving infrared imaging, spectroscopy, and a (risky) coronagraph. Participation in a dark energy mission is the highest priority recommendation in the 2010 LRP. WFIRST is one of several missions that could meet this priority.

The committee wondered how membership on the Science Teams would benefit the Canadian astronomy community. Hudson responded that Canadian membership may be possible on 8 investigation teams. However, the structure and size of the teams is yet unclear, as is the route to Canadian participation. A possible contribution from CASTOR was mentioned. CASTOR would provide deep U & g

## JCSA Meeting Report June 2014

images to measure photometric redshifts to calibrate weak lensing that would be deeper and more precise than LSST will be able to provide.

Another route to Canadian participation would be through coronagraph technology development. However, the coronagraph was considered risky in the Harrison report, so tying Canadian participation to the coronagraph would likewise be risky. Other possibilities include contributions to the IFU in the Wide Field Imager and other detector development. The CSA's next step is issuing a Request for Proposals, a process the committee found confusing. The JCSA had several questions regarding Request for Proposals for a mission concept study. How will the RFP be structured? Will one or multiple contracts be considered? What will it encompass? How will the document deal with Canada's participation in both science and hardware development? The committee urged the CSA to consult widely before issuing the RFP.

Timeline: Science definition team concludes its work early in 2015. Science teams will be formed in 2016, but procedures are not final. Launch is anticipated between 2023-25, although NASA may be pushing for a 2022 launch.

### **JWST/Doyon**

JWST is on (current) budget and on track for a 2018 launch, with a 13-month contingency. The timeline has been stable for 3 years. Major upcoming event: changing detectors/grisms, which has risk. The new detectors are nearly in hand, with testing at Com Dev scheduled for summer. A problem with detector electronics FPGA code is being worked with good prospects for success. An issue with grism coatings was discussed confidentially, although a solution is uncertain.

Other discussions: the leadership is considering shortening the JWST data proprietary period to 6 months following data delivery, rather than the usual 12 months, to allow investigators to plan future observations under a relatively short, 5 year mission lifetime.

JCSA issue: ESA has apparently approached CADC to provide a JWST mirror archive. The plan includes the opportunity for CADC to provide a user interface. Current thinking holds that the transition from HST to JWST archiving could be done with little increased cost to the CSA.

### **Castor/Hutchings (for Cote)**

The concept study headed by Pat Cote has been completed and development work on detector technology is ongoing. The CSA is preparing an RFP for a Phase 0 study.

## JCSA Meeting Report June 2014

Following Phase 0, a science team will be struck and mission requirements developed. The detector study is proceeding apace; current risk concerns filter red leak. An RFP should be announced by the CSA prior to the next JCSA meeting.

### **UVIT/Hutchings**

The UVIT visible channel (VIS) has failed with what is now the fourth attempt to fix it. The CMOS detector is being installed on the camera, with the new system expected to be finished within one month. The camera is needed for drift tracking. If it fails, the near UV imager may be used for drift tracking, with some loss of efficiency. Another option would be to install a new detector. Hutchings was unhappy with this option because of increased risk and possible delay. Otherwise the project is holding for UVIT, with launch scheduled 5-6 months following delivery. Science planning is proceeding apace. Current plan: PV phase lasting six months, followed by six months of GTO time. The CSA is commended for continuing its support to ComDev for this work.

Funding: the CSA has set aside \$50K per year for science support. It is unclear how best to allocate meager funding given that roughly 600 hours per year of observing time will be awarded to Canadian investigators. How to allocate the funds in the first year is an additional challenge: GTOs will have data and need analysis support. John Hutchings has agreed to submit a memo to JCSA dealing with this issue.

### **Canadian Space Exploration Plan Laurin/McNamara**

A draft response to seven questions regarding the CSEP was submitted to the CSA on June 2. Other edits were forwarded to co-chair McNamara and are being integrated into the document for resubmission to the CSA. Responses from all consultation committees will be integrated into CSA's Strategic Plan with recommendations from the JSECC. All recommendations will be integrated and vetted for consistency with CSA policy by March 2015.

### **WISH/Sawicki**

WISH is a JAXA-led, space-born IR observatory with a 1.5 m primary mirror and wide field imager. Its unique features include a 900 square arc-minute FOV and filters offering spectral coverage out to 5 microns. Its primary science objective is to measure the assembly of stellar masses of galaxies using rest frame 6000 Angstrom images. The wide field IR imaging would complement JWST, CCAT, LSST, and Euclid by identifying and studying bright,  $z = 9-15$  Ly break galaxies. Other science includes, high-redshift supernova detection and studies of stars and nearby galaxies.

If selected, WISH could launch in 2021. A call for proposals was postponed by cost concerns with SPICA. However, SPICA will now be a joint JAXA-ESA mission, freeing a wedge within JAXA for WISH. The Phase A Announcement of Opportunity is

## JCSA Meeting Report June 2014

expected in FY14. In the US, proposals for memoranda of understanding are due in Fall 2014. Giovanni Fazio (CFA) is expected to propose a \$60M detector. France is also expected to propose a spectrograph. Letters from JAXA and the WISH PI indicating interest in Canadian participation have been sent to the CSA.

The plan currently envisions 25% open observing time and 75% survey time over a 5-year mission lifetime. A Filter Exchange Unit was proposed for a Canadian contribution (\$5-10M). France will likely contribute a \$10M image slicing spectrograph (this low projected cost was questioned). WISH has not been approved by JAXA. The JCSA questioned the filter design and its cost estimate. JAXA is apparently open to other design proposals

The PI has apparently agreed to share all technical design material with the CSA. Laurin and Dupuis agreed that that the CSA's engineering team would be willing to review the design.

JCSA asked the usual questions: how would participation in WISH benefit the Canadian astronomical community? Answer: seats on science team but, but beyond that the situation is in flux.

### **JCSA Recommendations:**

- 1) The JCSA has continually advocated tying research funding to support science investigation to its space astronomy missions. Several models have been suggested including, seeking additional revenue streams from other governmental agencies. Samir Boughaba, Team Leader, NSERC Mathematical, Environmental and Physical Sciences Division, is interested in discussing this matter with the CSA. He stressed the need to act if resources are to be secured by the 2015-16 timeframe. UVIT and ASTRO-H would be good prototypes to develop a working model in time for launch of JWST in 2018. The space policy document openly encourages interagency cooperation. A number of models should be considered including, matching grants from the CSA and NSERC awarded to successful guest and guaranteed time investigators. In addition, prelaunch science support is needed to enable adequate science planning.
- 2) The SSEP program was an outstanding example of funding larger scale analysis and exploitation of CSA's scientific assets. This should include funding for archival research. We encourage the CSA to reprise a program like the SSEP, perhaps in cooperation with NSERC.
- 3) The CAMS collimator instability problem is urgently in need of a solution. The JCSA is disappointed that the manufacturing and design problems were identified at such a late date. The JCSA is pleased that the CSA formed a Tiger

## JCSA Meeting Report June 2014

- Team that has identified the problem and possible fixes. We encourage the CSA to monitor progress closely and to allocate the resources needed to ensure CAMS is operational and is delivered on time for integration onto the spacecraft. Success is critical for ASTRO-H's success and to maintain CSA's reputation as a reliable space partner. The CAMS team is hobbled by the departure of its dedicated calibration scientist. This problem has come home to roost with the ensuing hardware problems and the likely need for further calibration. Finally the ASTRO-H team's funding will end prior to launch, and the JCSA encourages continued funding to the team well beyond launch.
- 4) Involvement in a future X-ray mission is a high priority of the Canadian Long Range Plan. Athena+ has emerged as IXO's successor. Athena+ has a good chance of being selected by ESA for development toward a 2028 launch. The JCSA encourages the CSA to make travel funds available for a Canadian presence at ATHENA+ collaboration meetings, in preparation for mission involvement.
  - 5) The JCSA is encouraged by and applauds the CSA's progress at getting a Phase 0 study call for proposals out for CASTOR.
  - 6) Participation in a dark energy mission is the highest priority in the 2010 LRP. WFIRST enjoys overwhelming support both in the US and international community. We encourage the CSA to consult widely before issuing the WFIRST RFP to ensure that it effectively solicits and encourages participation from a broad array of Canadian scientific and technological expertise.
  - 7) The JCSA encourages the CSA to review the \$450K cap on FAST grants, which is too small to fund most astronomy-related balloon flights. A possible work around would allow multiple teams/institutions to collaborate by combining two or more FAST grants.

Brian McNamara



Co-chair, JCSA  
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