

## **Report of the CASCA Ground-Based Astronomy Committee (GAC): May 2016**

### **Membership and Activities**

Craig Heinke, University of Alberta (chair, 2013--16)

John Hutchings, National Research Council (2009--2016)

Erik Rosolowsky, University of Alberta (2013--16)

Jon Willis, University of Victoria (2014--17)

David Patton, Trent University (2016--2019)

Kenneth Tapping, National Research Council (continuing member, spectrum management)

### **Future Facilities:**

#### **TMT**

The project awaits the process of re-issuing the building permit for Mauna Kea. TIO has indicated that they must have a decision on whether they can build on Mauna Kea by a deadline of Sept 2017, so that they can begin work on the site in early 2018. Beyond this, they are considering alternative sites as backups, but no alternative sites have been formally announced. The off-site contracts continue, as do discussions for second generation instruments, and regular science meetings of the partners.

NRC have received a commissioned report from Doyletech Corporation on the commercial value of six technologies developed for the SKA and TMT projects. They are adaptive optics, and precision probe positioning for TMT; and phased arrays feeds, signal processing, cryogenic amplifiers, and composite antennas for SKA. The report is favourable on all of them.

#### **LSST**

The University of Toronto has signed a memorandum of agreement with the Large Synoptic Survey Telescope Corporation (LSSTC) that provides access to LSST for a Canadian Consortium. The Consortium consists of a defined set of principal investigators (PI), who each have full access to LSST data, tools and working groups, along with up to four postdocs or students per PI. The signed memorandum provides for 10 initial PIs across Canada (at an approximate cost of US\$21500/year/PI for ten years), but allows the number of participants and associated payments to be increased at any time. The Dunlap Institute has committed to provide up to 50% funding for these first 10 PIs. Responding to a call for interest sent out to the CASCA membership, 16 PIs have joined the Canadian LSST Consortium so far, of which 10 will be subsidised by Dunlap and 6 have agreed to provide full funding.

There is a more general issue of spectroscopic follow-up of LSST that could be provided by the proposed MSE, but there is no formal connection at the moment. Gemini South is also a possible way of providing regular spectroscopy of LSST targets, but this would require a restructuring of Gemini and a full engineering study.

#### **SKA**

The Canadian prototype moulded antenna was not selected for SKA, but there remain several other hardware and software contributions available to Canada, for the nominal 6% share of SKA1. There are science groups and an advisory committee chaired by Bryan Gaensler who are keeping abreast of the details and science drivers, and attending project meetings. The status of Canadian partnership outside the SKA treaty organization is in discussion.

### **CCAT**

The US National Science Foundation recently turned down a proposal to provide a share of construction funding for CCAT, a 25m dish facility on the Atacama. Other funding partners were waiting to follow the US NSF lead. The consortium is exploring other routes forward to construct a full facility. One idea of particular interest to the Canadian community would be the construction of a small dish facility at the original high altitude site. This would permit site development (roads, buildings, and power supply), provide a facility for the testing of instruments being developed for CCAT, and the high altitude site would provide unique science opportunities. This would also show the feasibility and costs involved in building a facility at such high altitude, partially answering the concerns expressed by NSF and increasing the likelihood of success on a future proposal for the full CCAT. Funding channels and partners of such a smaller facility are still being determined.

### **MSE**

The MSE project currently consists of an active partnership between Canada, France, Hawaii, China, India and, most recently, Spain. A successful year of development has culminated with a full science and engineering team meeting in Madrid and good exposure at the recent CFHT Users' Meeting where contributions from both the Gaia and Euclid teams pointed to the importance of MSE to the full scientific achievement of their projects. The MSE Detailed Science Case (a 200-page document with a separate, 10-page summary) will be publicly released (via astro-ph and the MSE web portal) in May 2016. Conceptual design studies are underway for most of the major observatory subsystems, with a few outstanding subsystems (dome, telescope structure, etc) due to commence in the coming months. The culmination of these studies will be a project cost review in early 2018 which will incorporate the results from the conceptual design studies, the detailed science case and cost-caps from partners to develop a robust baseline cost for the observatory.

### **Current Facilities:**

## **CFHT**

The Canada France Hawaii Telescope has had a very successful year. The most important achievement has been the successful commissioning of the Sitelle Imaging Fourier Transform Spectrograph during the early part of 2016. Science verification proceeded well and the instrument was offered to the community as part of the 2016B call. The instrument data reduction pipeline is currently completing development with the Sitelle team before being handed over to CFHT during 2016. In May 2016 the 11th CFHT Users' Meeting was held in Nice. Ninety scientists attended the meeting, thirty of which were Canadian, and feedback from attendees points to a vibrant meeting and reflects in a positive manner on the continued position of CFHT at the forefront of scientific research. Other updates this year include the progress of the SPIRou instrument to the build phase with the instrument potentially available to the community in 2017B. Some tension remains over the timescale required for the acquisition of a science-grade detector. However, the build phase is currently proceeding with an engineering-grade detector instead. The EsPaDoNS/GRACES collaboration with the Gemini North telescope has continued to work very well, providing the Gemini community with access to EsPaDoNS and the CFHT community receiving Gemini time in return. The two telescope directors, guided by their respective SACs, are currently discussing the logistics by which Gemini time will be offered to the CFHT community.

## **JCMT**

Canadian participation in the JCMT continues through January 2017 under the current arrangement. Specifically, six universities have made a cash contribution to the East Asian Observatory (EAO) and the CADK provides continuing in-kind support for the JCMT archive. Given these contributions, Canadian astronomers have access to a small portion of PI time and access to the Legacy Surveys. Seven legacy surveys are underway with broad participation from the Canadian submillimeter community including leadership and PI roles. Canadian PI time remains heavily oversubscribed. Members of the community are convening after this year's CASCA Annual meeting to discuss the future priorities for the Canadian submillimetre astronomy, and our participation in the JCMT after the current agreement ends will be discussed.

## **Arecibo**

The contract to run the Arecibo observatory will expire in Sept. 2016 and the US NSF is actively seeking partners to continue funding the facility. Divestment and closure of the facility remain a very real possibility. The loss of access to the facility would impact several astronomers across the country, reducing access to a telescope facility that is ideal for studying atomic gas in nearby galaxies, pulsars, and the magnetoionic medium.

## **NRAO**

At the time of our previous report, the Associated Universities Inc. (AUI) had just received the contract from the US NSF to run NRAO for 10 years, but only providing funding for the VLA and ALMA. Both the GBT and the VLBA were spun off into different observatory management

structures, also run by AUI. However, the funding streams for the newly constituted Green Bank Observatory and the Long Baseline Observatory (LBO) are not secured in the long term and remain under negotiation between AUI and the NSF. The LBO is progressing toward a joint venture with the US Department of Defense and the US Naval Observatory. The GBO will likely face some pressure to reduce its operational budget, but compared to the VLBA, the GBT is close to operating as an independent facility. At present, the situation remains status quo, but the partitioning of the administration of the different facilities offers a route for mixed funding models or divestment for the different facilities. Fall 2016 will be the first call for proposals run under the split system, though the same review panels will be used. Canadian astronomers continue to make heavy use of all the NRAO facilities, and a few Large multi-year projects with Canadian leadership will be impacted by a potential divestment.

A consortium of Canadian universities is exploring a partnership with NRAO to support the science exploitation of the VLA Sky Survey. The VLA Sky Survey will undergo test observations this summer with Survey observations occupying up to 12% of the observing time until 2022. Three Canadians are participating on the Science Steering Group and Stefi Baum (Manitoba) is co-PI of the Survey.

## **ALMA**

While formally done with Early Science Operations, ALMA continues to build out its capacity, incorporating expanded correlator functionality, polarization capabilities, total power, and long baseline modes. Software development and data delivery continues to lag the observed data stream. The recent Cycle 4 Call for Proposals received 1600 proposals, the highest total yet, and was the first call that accepted Large (>50 hour) proposals.

## **Gemini**

Gemini's new access via optical fibre to CFHT's EsPaDoNS instrument (GRACES) is working well and has proved very popular, becoming the most requested instrument on Gemini last semester. The Large and Long Programs have continued to be popular, though all 15 LLP proposals accepted from the last call had US PIs. The Fast Turnaround program faces small-number statistics, so oversubscription varies dramatically. Japan has expressed interest in accessing Fast Turnaround time on Gemini, in exchange for Subaru time.

Gemini-North issues: The installation of red-sensitive Hamamatsu CCDs in GMOS-S has proved more challenging than expected. Due to a severe engineering personnel shortage, the upgrade of the GMOS-N CCDs to Hamamatsu CCDs has been postponed to 2017. The Altair AO system needs a new real-time computer.

Gemini-South issues: Flamingos-2 will be offline during May to upgrade the on-instrument wavefront sensor, after which commissioning of multi-object spectroscopy mode will be resumed. GEMS should have a new laser with increased power by the start of 2017 at latest, and new sensors, which should deliver much better performance than it has had recently. GPI is functioning well.

Future: The Request for Proposals for the next instrument, Gen4#3, has now been released. This wide-band medium-resolution spectrograph will be designed to take advantage of

opportunities provided by LSST, and should be commissioning in 2022 as LSST starts survey operations. Discussions are underway about the role of Gemini in the 2020s (necessary to meaningfully discuss the next instrument), but it is hard to make these decisions until the path forward for TMT is resolved.

### **New members**

We need two additional members on the GAC to reach full strength; Drs. Barmby and Parker have completed their terms, and Dr. Joncas requested relief, for department chair duties, but we've only added one new member this year (Dr. Patton). Next year, we'll need at least one more, to replace Dr. Rosolowsky. Drs. Heinke and Hutchings have volunteered to stay on for another year if the Board chooses. So we request (at least) three new members for the next year.