RAC report

A CASCA RAC telecon was held Friday, April 18, 2008. Present were James di Francesco, Sean Dougherty, Martin Houde, Ingrid Stairs (chair) and Ken Tapping.

1) Administrative changes.

Martin Houde has agreed to serve as RAC Chair for 2008/9. His appointment has been endorsed by the Board. Ingrid Stairs will stay on the RAC for the next year for the sake of continuity.

Martin will attend the AGM meeting with Board to discuss possible committee restructuring.

James di Francesco is leaving the RAC, and Tracy Webb (McGill) has agreed to serve in his place. The Board has also endorsed her appointment. We thank James for his excellent service!

2) Old business.

a) While there is apparently the will to find someone within HIA to replace Ken Tapping as spectrum manager, nothing has actually come of this yet. We remind the Board that Ken will be stepping down from spectrum management at the end of this calendar year, and there needs to be at least 6 months' overlap to train a successor. We ask for the Board's continued active support of this increasingly urgent need.

3) Observatory Reports.

A) Radio Astronomy Frequency Protection -- Ken Tapping

i) DRAO Interference Studies

Over the last year DRAO has been working with the local (Kelowna), regional (Vancouver) and national (Ottawa) spectrum managers in Industry Canada to do a study examining and evaluating the "Controlled Emission Zone" surrounding DRAO. This involves making transmissions in the radio astronomy band being studied (406.1-410 MHz in this case) and comparing measured and calculated path losses as a function of location around DRAO. The objectives are to (i) establish the transmitter power as a function of location that will reach the DRAO interference threshold, and (ii) establish whether propagation models are applicable to determining this, or whether measurements always need to be made.

So far the answer seems to be (ii) in that there are large (up to 20dB discrepancies) between modelled and measured path losses. Work continues.

It is hoped that this work will yield a template for cooperative actions between the administration and radio observatories for defining and managing protection and radio quiet zones.

ii) Noise Floor Project

Interference from individual sources is an important issue, but in principle, if the cause and the interference mechanism can be identified, some form of mitigation may be applicable. However, a much more worrying issue is the increasing background noise level produced by the rapidly growing number of devices that are intentional or unintentional transmitters. The only apparent means to control such interference is to keep the sources of it as far away as possible, which may impact choices of sites for radio telescopes, the sizes of the buffer land areas surrounding those observatories and the agreements with local authorities about spectrum use and regional development.

iii) Band Allocations to 3000 GHz

Work is continuing on this one, which should come into fruition before 2011 or so, in time for the next World Radio Conference. There has been plenty of input, so no special action is required. However, the Canadian radio astronomy community should be polled one more time, for any late input. Note that although we will not get all we ask for, being ready has enabled highly successful band grabs in the past, such as when the 71 - 275 GHz frequency allocations were revised.

iv) THz Astronomy

This is evolving and should be ready for submission at the next meeting of ITU Working Party 7D, currently scheduled for October. The Canadian Delegation has informed the Working Party that this contribution is coming.

B) JCMT -- Martin Houde

SCUBA-2 arrived in March, and was brought up to the JCMT, mounted, and alignment started in April, before it was again dismounted. It will again be installed on the JCMT (and alignment completed) in May

(12-22), with commissioning to start right after that. On-sky commissioning should begin in July. Currently only the engineering-grade arrays are installed, but they are enough to start testing observing modes, etc. The science-grade arrays (hopefully all of them) are scheduled to be delivered in November, and installed before the end of the year.

HARP has 14 of the 16 receptors working, although a couple of them are very unstable at certain frequencies (most notably at 13CO/C18O). They are continuing to make progress on improving the calibration, but there are still some problems, mostly stemming from the above instability. MRAO is constructing some spares, which should fix at least one of the non-working receptors. These should be delivered this fall, with installation to follow.

RxA (230 GHz) is working as always. However, Oxford instruments is investigating the possibility of installing new A-band mixers in the old RxB3, and may submit a proposal to the JCMT Board to this effect.

RxW(D) (690 GHz) now has two working channels (which work fine in the receiver when in the lab) and has been reinstalled on the telescope. However, recommissioning has been hampered by poor weather.

RxW(B) (345 GHz) has a broken mixer, but repairs were postponed in order to get the D-band mixers back on the telescope. Two working mixers are needed for use by the eSMA.

A meeting of the three telescope directors resulted in a strong push to get the eSMA fully commissioned, so that a call for science proposals can be issued this summer. We are routinely getting fringes between all the antennas (8 SMA + JCMT + CSO) at 230GHz, even with long baselines. The broken RxW(B) mixer and high Tsys of the other mixer are hampering progress, however. On the other hand, they got what may be their first genuine science result in early April: a CI line in absorption toward a Z=0.9 quasar!

Despite a somewhat negative-sounding report, things are apparently really going very well at the JCMT, with low fault rates and tons of data rolling in. The Nearby Galaxies JCMT Legacy Survey has nearly completed its HARP observations, and they are examining their data carefully. The Gould Belt and Spectral Legacy Surveys are also progressing.

C) ALMA -- James di Francesco

i) ALMA Personnel News

a) ALMA Project Director

As of 01 March 2008, Thijs de Graaw (SRON) has been appointed Interim ALMA Director for one year, while the search for a permanent Director continues. Thijs is presently the PI of the HIFI instrument on Herschel, and was the PI on the ISO-SWS instrument on ISO.

b) ALMA Project Manager

Tony Beasley, the ALMA Project Manager, has tendered his resignation and is leaving to direct the NEON climate observatory centred in Boulder, CO. Tetsuo Hasegawa (NAOJ) will become Interim ALMA Project Manager effective 01 May 2008. Tetsuo has been the ALMA Project Director and Project Manager for the Japanese contribution to ALMA. (In conjuction with the search for a new permanent ALMA Director, the search will be expanded to look for candidates for the permanent ALMA Manager position.)

c) Head of Technical Services

Richard Prestage, formerly the Assistant Director of NRAO Green Bank operations, has become Head of Technical Services for ALMA.

d) ALMA Project Scientist

Richard Hills, formerly of Cambridge University, has taken up residence in Santiago and has begun working in earnest in his new Project Scientist duties.

e) CASA Assistant Scientist

Rob Reid, formerly of DRAO and U of Toronto, and presently at NRAO in Char- lottesville, VA, has accepted an Assistant Scientist position with CASA, to start 01 June 2008

ii) News of Interest

a) Science

The NAASC will hold a workshop in Charlottesville, VA on "Transformational Science with ALMA: The Birth and Feedback of Massive Stars, Within and Beyond the Galaxy" on 25-27 September

2008. More details can be found on the web at:
http://www.cv.nrao.edu/php/meetings/massive08/

The ALMA North American Science Advisory Committee (ANASAC) and the ALMA Science Advisory Committee (ASAC) are currently defining a development plan for ALMA, and is forming committees to explore what ALMA instrumentation will be most needed after construction has officially finished. A variation of the Gemini "Aspen" process for new instrumentation is being discussed.

The proceedings of the "Science with the Atacama Large Millimetre Array: A New Era for Astrophysics" meeting held in Madrid in November 2006 have been published by Astrophysics & Space Science. The contributed papers to this volume are available at http://tinyurl.com/32pq3o.

b) Receiver Band / Front End Construction

The first front-end assembly, Front End SN01, has been disassembled for shipment to the OSF, making it the first receiver package to arrive in Chile.

c) Antenna Test Facility (ATF)

Work continues at the ATF, mostly debugging control software for the two element interferometer consisting of one North American (Vertex) antenna and one European (Alcatel) antenna. There has been Canadian participation in ATF tests recently, with week-long visits by James Di Francesco, Henry Matthews and Doug Johnstone of HIA. The first ATF spectral line data of Orion was reduced from end-to-end by George Moellenbrock of NRAO using the CASA software package. The ATF is expected to close on 01 June 2008, be dis-assembled and sent to Chile but a 3-month extension is currently under consideration.

d) ALMA Software

The CASA Beta Test continues, and the first patch was released on 15 April 2008. The limited release is being done intentionally to minimize the impact on the nascent CASA helpdesk system, which is just being started at the various ALMA Regional Centers.

e) ALMA Hardware

A small setback occurred for the first European (Alcatel) antenna as two of its backup structure (BUS) interface flanges were

damaged during transport. Repairs are underway.

f) Chile

Up-to-date images of ALMA construction happenings in Chile can be found at: http://www.alma.nrao.edu/almanews/almagallery/index.html

7 12-m antennas (3 Vertex and 4 Mitsubishi) are now at the ALMA site, in various states of assembly and acceptance testing, and the components of an 8th (a Vertex one) have been delivered to Chile. A two-antenna correlator has been installed at the Operations Support Facility and has passed initial tests. In addition, the Atacama Compact Array Correlator was installed at the Array Operations Site and has been undergoing tests.

The two 115-ton ALMA antenna transporters, "Otto" and "Loge", each 20 metres long, 10 metres wide and with 28 tires, arrived at the ALMA operations base camp on 14 February 2008. They are currently undergoing a several months of extensive tests before being used to move actual ALMA antenna hardware.

A call for tender for construction of the permanent central ALMA office in Santiago, located on the ESO grounds in Vitacura, has been prepared.

iv) Canadian ALMA News

a) Band 3

All 8 pre-production Band 3 cartridges were delivered to NRAO by the end of January 2008. The first production cartridge body has been received. Work proceeds to accelerate the production schedule, with the goal of producing 1 cartridge every two weeks (!). This requires a new suite of test equipment in the HIA-Victoria labs, with the cost supported by funds from NAOJ through NRAO.

b) Band 1

The ATRG-V is exploring the possibility of collaboration with the groups in Chile and Taiwan to build Band 1 receivers for ALMA, as part of its nascent Development programme. A 2-3 day meeting at HIA-Victoria to discuss Band 1 science and technology is being planned for October 2008.

c) Canadian ALMA Operations

New versions of the Memorandum of Understanding between HIA and NRAO that outlines the principles of the partnership and the proposal for the levels of in-kind contribution by Canada to North American ALMA Operations are in the process of revision, following feedback on the last version returned from NRAO to HIA. It is expected that negotiations will continue on this issue through the first half of this year.

d) Archive

Norm Hill of NRC-HIA has travelled to Garching, Germany to present the CADC contribution to the ALMA Science Archive.

e) ANASAC

NRAO has declined to have Douglas Scott join the ALMA North American Science Advisory Committee, on the grounds that Canadian participation at the current level of 1 member is appropriate

f) CFI ALMA funding

The CFI grant to University of Calgary for ALMA software developement, slated to expire on June 2008, has been extended by one year. Assigned software work has been largely completed but enough funds remain for new possibilities. Russ Taylor is currently exploring new directions for the Calgary ALMA software effort with Brian Glendenning, the ALMA Computing IPT leader.

D) EVLA -- Sean Dougherty

The EVLA correlator recently passed a number of key milestones. The complete manufactoring run of the custom ASIC chip, designed at DRAO, was successfully completed, and all 12000 chips delivered. The chips are currently being tested by a Canadian company to ensure that they have no manufacturing defects.

The complex 45 FPGA, 28 layer Station Board that carries out the filtering of the data from the VLA antennas and gives the correlator its amazing flexibility, completed successfully its prototype testing. The pre-production run of 14 boards was initiated at the end of March. The Baseline Board that actually carries out the correlations is in the final stages of proto-type testing and it is hoped that it will be released for a more limited production run at the end of May. The first tranche of eight correlator racks will be

shipped May 15 and installation at the VLA will start on June 9. The poto-type correlator consisting of 2-station boards and 1 baseline board to be used for critical on-the-sky tests will be shipped and installed with the other racks.

Assuming all goes to plan, the critical design review is still scheduled for October 2009. After that, the full production of the correlator boards will start.

E) SKA -- Sean Dougherty

i) HIA Changes and Progress

Recently, Peter Dewdney announced his retirement from NRC-HIA after 32 years, in order to take up his new challenge as the International SKA project engineer at the new SKA Project Development Office at the University of Manchester in the United kingdom. In spite of his departure from HIA, the research and development for the SKA that is an integral part of on-going activities at DRAO, will continue to be of great interest to Peter in his new post.

In his place, Sean Dougherty has taken up the role as "Officer in Charge" at DRAO, with Gary Hovey taking charge of Engineering.

R&D at HIA continues, with work on the Mark 2 version of the Composite antenna well-advanced. This second iteration of the CART design aims to improve the surface accuracy to better than the 0.8mm rms of the first prototype and to improve the manufacturing process, essential for large volume production such as required for the SKA. This work is of interest to the Technology Demonstrator Programme (TDP), a 12M$ NSF funded project led by Cornell University and includes many institutes across the US, and Canada. The first TDP antenna working group meeting was recently held in San Fransisco, and attended by a number of people from HIA and the U of Calgary.

Concurrently, HIA staff are working in collaboration with an industry consortium to prepare a composite-based proposal in response to the Request for Tender for the antennas required for the Australian SKA Pathfinder project.

The Phased-array Demonstrator has been under test in the laboratory, in preparation for mounting on the Mark 1 composite reflector for on the sky testing.

The RF device group at U of Calgary have just received their first

65 nm room temperature LNAs. These will be tested to see if they improved noise characteristics over the previous LNA designs that attained better than 14K across 800-1500 MHz.

Work on these three technologies will be a advanced further as part of Canada's contribution to PrepSKA.

ii) PrepSKA

On April 1, 2008 the PrepSKA project started. This is a preparatory study for the SKA, funded under the EU Framework 7 programme at the level of 5.5MEuro from the EC and ~15MEuro in contributions from PrepSKA partners around the world. This is a European-led initiative, but is a global project. The goals of PrepSKA are to address: the legal framework and governance structure of the SKA; cost-effective mechanisms for the procurement of the SKA components; how will the SKA be funded; where will the SKA be sited; and the design for the SKA. PrepSKA aims to integrate the on-going R&D work from around the globe in order to develop the fully-costed design for Phase 1 of the SKA, and a deployment plan for the full instrument. With active collaboration between funding agencies and scientists, all of the options for the policy-related questions will be investigated. The principal deliverable will be an implementation plan that will form the basis of a funding proposal to governments to start the construction of the SKA.

The initial kick off meeting was held during the recent SKA2008 meeting in Perth, Australia and involved participants from around the world, including representatives of several government agencies from countries involved in the SKA (e.g. Australia, The Netherlands, United Kingdom). Canada is engaged in this project, with the Director General of NRC-HIA, Greg Fahlman, participating in a number of the policy working groups, and both NRC-HIA and University Calgary are involved in the SKA design work package. Sean Dougherty (NRC) and Russ Taylor (UCalgary) represent Canada's interests on the PrepSKA board. For more information see www.jb.man.ac.uk/prepska

iii) SKA2008

The annual meeting of the SKA project was held in Perth, West Australia at the beginning of April. This was a large meeting spread over two weeks. The first week was dedicated to a conference on "Deep Survey Science with SKA Pathfinders" and discussed both science and engineering challenges related to the various pathfinder projects around the world. This was followed by several SKA-related meetings, but most notably the SKA Forum. This was a State and

Commonwealth government sponsored event that aimed to bring together both policy makers and industry leaders. This meeting was opened by the Commonwealth Minister of Science, Industry, Innovation and Research, Kim Carr, and the premier of West Australia, Alan Carpenter. The minister remained at the Forum for the whole day and also attended the SKADS workshop the following day. The presentations throughout the day show cased the science and the necessary technologies, and presentations by advocates for both the Australian and South African sites were made. Clearly, the Australians were putting on a demonstration of their committment to the SKA. It will be interesting to see what happens at the next Forum in South Africa in February 2009.

F) Education/Outreach -- Gil Holder

RAC web pages to be moved to main CASCA web site after all.