CFHT status update

Daniel Devost
Director of Science Operations
Canada-France-Hawaii Telescope
Subaru Users Meeting FY2017
CFHT status update

Staff changes

Daniel Devost
Director of Science Operations
Canada-France-Hawaii Telescope
Subaru Users Meeting FY2017
CFHT status update

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Canada-France-Hawaii Telescope
Subaru Users Meeting FY2017
Current instrumentation

**WIRCam**
20' x 20' NIR imager
128 Mpix

**ESPaDOnS**
High resolution (65-80k)
fiber fed spectropolarimeter

**MegaCam**
1° x 1° optical imager
360 Mpix

**SITELLE**
11' x 11' Imaging
3D FTS.
- MegaCam readout time was improved by about 7s.
- A timing system was added June 2017 to record the absolute times when the shutter opens and closes during an exposure. The system is synchronized to NTP with an absolute accuracy of 10 msek.
- ESPaDOnS two amps mode is now the default.
- SNRQSO is now the default mode for MegaCam and ESPaDOnS.
GRACES
A unique instrument involving two Observatories on Maunakea.

Daniel Devost
Director of Science Operations
Canada-France-Hawaii Telescope
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GRACES access time

Gemini Remote Access to CFHT ESPaDOnS Spectrograph (GRACES)

--- Under ground conduit
--- Above ground conduit
Partner status

ASIAA
NAOC
LNA

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Director of Science Operations
Canada-France-Hawaii Telescope
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-Associate partner since 2001 - Oldest CFHT associate partner with access to up to 20 nights per year.
-MOU valid until 2019.
-Participated in the development of WIRCam and are now developing the guide camera and systems for SPIRou.

-Can request up to 30 nights per year.
-MOU valid until 2018. The TAP money has run out and they are funding the program through NAOC. Other sources of financing are being sought.
-One of the MSE partners providing in kind contributions.

-MOU is expired and the status is still uncertain. They are still interested in getting time from CFHT.
-The MOU was revised and sent to LNA in May.
-LNA participates in the fiber development with SPIRou.

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Publications
Yearly number of publications.

CFHT Number of papers per year.
Yearly number of publications.

Σ = 2771 papers
Science highlights

Daniel Devost
Director of Science Operations
Canada-France-Hawaii Telescope
Subaru Users Meeting FY2017
### 11 science press releases since the last Subaru user meeting.

<table>
<thead>
<tr>
<th>Date</th>
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<tbody>
<tr>
<td>January 09 2018</td>
<td>Finding Extragalactic Supermassive Black Holes using AGN reverberation</td>
<td><img src="https://example.com/image1" alt="Image" /> Find out more <a href="#">here</a>.</td>
</tr>
<tr>
<td>November 20 2017</td>
<td>Haleakala and Maunakea Observatories team up to observe a visitor from outside the Solar System</td>
<td><img src="https://example.com/image2" alt="Image" /> Read more <a href="#">here</a>.</td>
</tr>
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<td>October 19 2017</td>
<td>Knowledge of interstellar dust questioned with WIRCam and Herschel observations</td>
<td><img src="https://example.com/image3" alt="Image" /> See more <a href="#">here</a>.</td>
</tr>
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<td>September 11 2017</td>
<td>Rocky Planet Enquifment Explains Stellar Odd Couple</td>
<td><img src="https://example.com/image4" alt="Image" /> Explore more <a href="#">here</a>.</td>
</tr>
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<td>August 17 2017</td>
<td>A high velocity White Dwarf is thought to have survived a Supernova event</td>
<td><img src="https://example.com/image5" alt="Image" /> Discover more <a href="#">here</a>.</td>
</tr>
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<td>June 05 2017</td>
<td>Limits separating stars from Brown Dwarfs found</td>
<td><img src="https://example.com/image6" alt="Image" /> Learn more <a href="#">here</a>.</td>
</tr>
<tr>
<td>April 18 2017</td>
<td>Massive exoplanet discovered using gravitational microlensing</td>
<td><img src="https://example.com/image7" alt="Image" /> Investigate more <a href="#">here</a>.</td>
</tr>
<tr>
<td>April 12 2017</td>
<td>Waterloo astronomers use CFHT to capture the first image of a Dark Matter Bridge</td>
<td><img src="https://example.com/image8" alt="Image" /> Explore further <a href="#">here</a>.</td>
</tr>
<tr>
<td>April 04 2017</td>
<td>New clues about the early evolution of the Solar System revealed with simultaneous observations on Maunakea</td>
<td><img src="https://example.com/image9" alt="Image" /> Discover more <a href="#">here</a>.</td>
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<td>March 17 2017</td>
<td>Meridional wind on Venus detected for the first time in both hemispheres</td>
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<td>January 26 2017</td>
<td>A precise and independent determination of the Hubble constant</td>
<td><img src="https://example.com/image11" alt="Image" /> Learn more <a href="#">here</a>.</td>
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November 20 2017
Haleakala and Maunakea Observatories team up to observe a visitor from outside the Solar System.

Read more »
‘Oumuamua

Follow-up observations using CFHT on October 22nd allowed the first calculation of the eccentricity of the object and a first estimation of its color.
‘Oumuamua

Movie by R. Wainscoat.
Dynamical masses of Ultra Cool Dwarfs

June 05 2017
Limits separating stars from Brown Dwarfs found.

Read more
Dynamical masses of Ultra Cool Dwarfs

- A decade long program of astrometric monitoring of Ultracool M7-T5 dwarfs with CFHT WIRCam, W.M. Keck Observatory and HST.
- Measured 38 precise individual masses spanning 30–115 $M_\oplus$.
- They determine a substellar boundary that is $\approx 70 M_\oplus$ in mass ($\approx L4$ in spectral type).

Dupuy & Liu, 2017, APJS, in press.
Dynamical masses of Ultra Cool Dwarfs.
Meridional winds on Venus.

March 17 2017

Meridional wind on Venus detected for the first time in both hemispheres

Read more »

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Meridional winds on Venus.

First measurement of the Meridional winds on both hemisphere of Venus.

Measurements of the Solar light Doppler shift were made in 2014 during day time observing at CFHT.
Development

SPIRou

MSE

Daniel Devost
Director of Science Operations
Canada-France-Hawaii Telescope
Subaru Users Meeting FY2017
SPIRou

PI Jean-François Donati, IRAP, Toulouse France.
Co-PI René Doyon, Université de Montréal, Canada.
SPIRou science requirements

A high resolution spectropolarimeter capable of observing from Y to K in one single shot at a resolution of 75000.

Radial velocimetry down to 1 m/s is targetted.

Circular and linear polarimetry.

S/N~100 on stars with J~12 and K~11 in 1 hr.
The instrument.
The instrument

35 m of ultrapure Fluoride fiber link

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Photo: Sean Goebel, IfA
Pre-ship Review

We had the pre-ship review in November of this year.
Pre-ship Review

We had the pre-ship review in November of this year.

The instrument was cleared to be shipped to Hawaii.
Pre-Ship Review

Testing is performed on an H2RG while the instrument will use and H4RG (15 μm pixels).

The H2RG covers most of the spectral range with gaps. However, this was enough evaluating instrument parameters.

The H4RG will be integrated in Hawaii.
Testing is performed on an H2RG while the instrument will use and H4RG (15 μm pixels).

The H2RG covers most of the spectral range with gaps. However, this was enough evaluating instrument parameters.

The H4RG will be integrated in Hawaii.
Pre-ship testing.

Thermal stability is meeting the specs (1.6 mK) at 0.31 mK. Data taken from 3 temperature sensors during 70 hrs.
Pre-Ship Review

Artificial Star, ISU plate and Cass ADC

Cassegrain unit (with Rhombs)

Spectro + Detector.

Multiply above curves

Purple corrected for AS resp.

Flat field with AS

SPIRou overall throughput

Throughput vs. Wavelength (nm)
SPIRou schedule.

- SPIRou had been shipped and is scheduled to start arriving on January 21st.
- 15 nights of bright time is scheduled during the 2018A semester for commissioning.
- Science Verification should occur late in 2018A - early 2018B.
- Operations for Large Program should start mid-2018B and while normal operations are planned to start in 2019A.
Large Program call.

- We are currently having a call for Large Programs for all instruments for the 2018B to the 2022A semesters.
- At least 300 nights will be allocated to SPIRou.
- 100 nights will be allocated to the other instruments.
The Maunakea Spectroscopic Explorer

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Director of Science Operations
Canada-France-Hawaii Telescope
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The Maunakea Spectroscopic Explorer
The Maunakea Spectroscopic Explorer

- 3200 fiber positioner, 1.5° FoV
- 11 m segmented primary
- Low/Mid resolution spectrometers
- High resolution spectrometer
MSE collaboration
MSE Project office

Project Manager
Rick Murowinski (Contract)

Project Scientist
Alan McConnachie (NRC)

System Engineer
Shan Mignot (GEPI)

Segmented Mirror Specialist
Eric Williams (Contract)

Project Engineer /
Deputy Project Manager
Kei Szeto (CFHT Staff)

System Scientist
Nicolas Flagey (CFHT Staff)

Deputy Project Engineer
Alexis Hill (CFHT Staff)

Notable Support
Derrick Salmon (CFHT)
Will Saunders (AAO)
Peter Gillingham (AAO)
# MSE Current schedule.

<table>
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<tr>
<th>Milestone</th>
<th>Date</th>
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<tr>
<td>Subsystems’ CoDRs</td>
<td>End of June ‘17</td>
</tr>
<tr>
<td>System CoDR</td>
<td>September ‘17</td>
</tr>
<tr>
<td>Baseline Design and Cost approved</td>
<td>December ‘17</td>
</tr>
<tr>
<td>Prospectus Available</td>
<td>January ‘18</td>
</tr>
<tr>
<td>Master Lease renewed (earliest date)</td>
<td>April ’19</td>
</tr>
<tr>
<td>Construction Proposal Review</td>
<td>April ’19 +</td>
</tr>
<tr>
<td>Begin CFHT Deconstruction</td>
<td>Nov ’21 +</td>
</tr>
<tr>
<td>Science Commissioning</td>
<td>Mar ’26 +</td>
</tr>
<tr>
<td>Full Operations</td>
<td>Aug ’26 +</td>
</tr>
</tbody>
</table>
MSE papers.

https://arxiv.org/abs/1606.00043

The Detailed Science Case for the Maunakea Spectroscopic Explorer:

The Composition and Dynamics of the

01.01.00.003.DSN
Version: A
Status: Exposure draft
2016-05-27

https://arxiv.org/abs/1606.00060

A concise overview of the Maunakea Spectroscopic Explorer

Version 1.0, 2016-05-27

Alan W. McCracken 1,2 (MSE Project Scientist)
Science Team Contributors: Carine Babusiaux 1, Michael Bolte 1, Elisabetta Caffau 1, Pat Caffau 1, Simon Driver 1, Aaron Robotham 1, Else Starchenburg 1, Kim Venn 1, Matthew Walker 1, Project Office Contributors: Steven E. Bauman 3, Nicolas Flagey 1, Kevin Ho 1, Sidik Ikami 1, Mary Beth Laychak 1, Shan Mignard 1, Rick Murowinski 1, Derrick Salmon 1, Doug Simons 1, Kees Sixt 1, Tom Vermeulen 1, Keesa Withington 1
## MSE reviews

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<th>Subsystem</th>
<th>Dates and Location</th>
<th>Performing Entity</th>
</tr>
</thead>
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<tr>
<td>Telescope Structure</td>
<td>3/16 – 3/17, Bilbao Spain</td>
<td>IDOM Spain</td>
</tr>
<tr>
<td>Enclosure</td>
<td>3/27 – 3/28, Port Coquitlam Canada</td>
<td>Empire Dynamic Structures Canada</td>
</tr>
<tr>
<td>High Resolution Spectrograph</td>
<td>4/26 – 4/27, Waimea</td>
<td>NIAOT, China</td>
</tr>
<tr>
<td>Fibre Transmission System</td>
<td>5/9, Waimea</td>
<td>NRC-HAA Canada</td>
</tr>
<tr>
<td>Fibre Positioner System (X2)</td>
<td>5/10 – 5/11, Waimea</td>
<td>USTC China and AAO Australia</td>
</tr>
<tr>
<td>Top End Assembly</td>
<td>Week of 5/29 (TBC), Meudon</td>
<td>GEPI and INSU-DT, France</td>
</tr>
<tr>
<td>Low-Moderate Resolution Spectrograph</td>
<td>Week of 5/29 (TBC), Lyons</td>
<td>CRAL, France</td>
</tr>
</tbody>
</table>
MSE reviews

Systems review currently happening in Waimea

Level 1
- Observatory Architecture
- Operations Concept
- Observatory Requirements

System Budget and Derivation
- Sensitivity Budget
- Observing Efficiency

Calibration
- Sky Subtraction Requirements Analysis
- Spectrophotometry Requirements Analysis

Compliance matrix
Risk register.
Looking toward MSE future.

CDR work is nearly completed and we look toward 2018 transition to seek greater contributions from MSE partners and are looking for new partners.

The MSE PO (CFHT) remains funded and is the sustaining core MSE staff, still managing/coordinating work overall.

In the meantime extensive efforts are underway at CFHT to lay the groundwork for the Master Lease renewal and resolve the conflict over Maunakea in a meaningful and lasting way…
Merci!