Annual Report 2008

Canada-France-Hawaii Telescope Corporation

The Canada-France-Hawaii Telescope Corporation

operates the CFHT 3.6 m telescope near the summit of the 4200 m dormant volcano Mauna Kea on the Big Island of Hawaii, USA. Support is provided by the National Research Council Canada, the Centre National de la Recherche Scientifique of France, and the University of Hawaii according to the agreement signed June 1974. CFHT is dedicated to the exploration of the Universe through observation.

NATIONAL RESEARCH COUNCIL CANADA

CONSEIL NATIONAL DE RECHERCHES CANADA

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

UNIVERSITY OF HAWAII

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CFHT images exhibited

at the Kahilu Theater Gallery

for the Première in Waimea

of the final version

of the movie/DVD

Hawaiian Starlight

14 December 2008

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Introduction

2005-2012: CFHT's Golden Age

Executive Director Christian Veillet

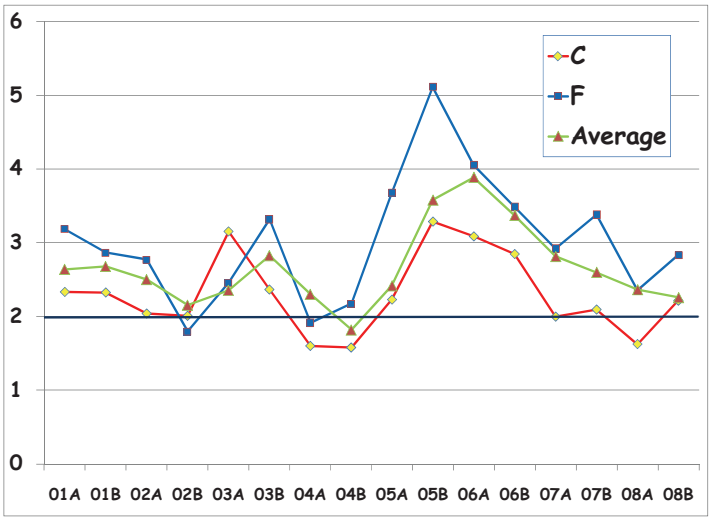
Year 4: Many achievements… and more to come!

UM2007, the triennial Users' Meeting held in May 2007 in Marseille (France), led to two important works: (1) opening New Large Programs for the period from mid-2008 to the end of 2012, and (2) defining one (or more) new instrument for beyond 2013. The year 2008 was therefore the time to concretize them. Four Large Programs, two using MegaCam and two CFHT's spectro-polarimeter ESPaDOnS, were selected and will use 30% of the observing time in the coming four years. Four teams were funded to prepare a feasibility study for a new instrument; one was selected for a Phase A study, another one for further development, while a third one was encouraged to proceed with the development of their instrument as CFHT guest instruments at the 2012 horizon. This report gives more details on both the LPs and the instruments.

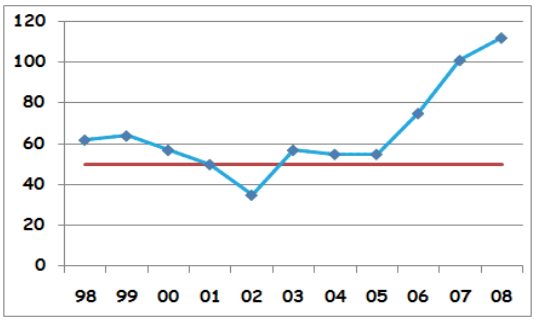
Operation-wise, the year has been very smooth, thanks to the excellent preventive maintenance work done on the instruments, and especially MegaCam. As a result, more energy could be dedicated on moving ahead with the Observatory Automation Project (OAP). The first phase of the project will allow single-handed remote observations from Waimea with nobody at the summit by the end of 2010. OAP will be for the two coming years the main in-house development.

CFHT was recognized as one of the "Best Places to Work" in Hawaii for the year 2008. Based on an anonymous poll of the staff through a thorough questionnaire, this competition was an excellent opportunity for the Observatory to assess on how it is perceived by its staff.

Thanks to its excellent safety program, CFHT was also recognized with a Governor's Honorable Mention (one of only three in the "General Industry -Small Business" category in the State to be recognized) at the 10th Biennial Governors Pacific-Rim Safety and Health Conference 2008 biannual held in Honolulu in May. CFHT was the highlighted company in the Conference inaugural speech of the Director of the State Department of Labor & Industrial Relations (DLIR).

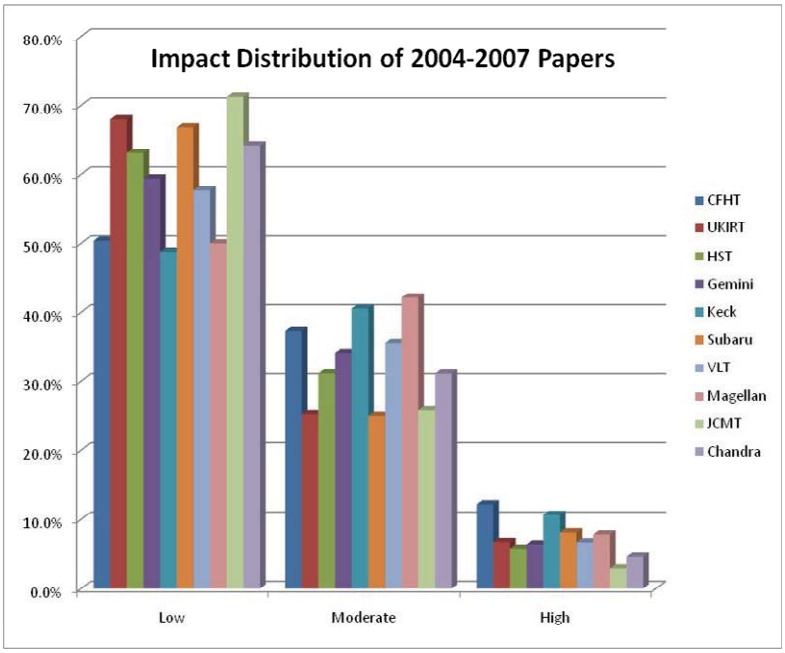


One of the goals of the Golden Age Plan (GAP) is to see the **oversubscription on the observing time** (or pressure) stay above 2, a value considered as healthy. For the two semesters of 2008, Canadian and French averaged pressure was indeed above 2, a good thing. It is clear however that the running average over two semesters (green line in the graph on the left) is decreasing. With the CFHTLS using a large fraction of the observing time over the last years, PIs have been discouraged to apply. In 2009, new LPs will use less observing time than the CFHTLS has used. Watching the pressure will show us if more time could be allocated to LPs without impacting too much the PIs' proposals.



The **number of refereed publications** based significantly on CFHT observations is a good indicator of the relevance of the data gathered by the telescope. The graph on the left shows this number fluctuating over the past years. This is the second year that the number of publications is over 100, while the goal of the GAP was 50. The high number of papers coming from the CFHTLS and the participation in the COSMOS project demonstrates that large programs are definitely very successful in generating a large number of publications, often beyond their initial goals.

What about the **impact** of those publications? It would not be good if all these papers were of little impact… Thanks to Dennis Crabtree, the impact of the papers from ten observatories was carefully looked at. The result is displayed in the graph on the right. It shows the percentage of papers in each of three 'impact bins' per telescope, covering the years 2004 to 2007. Ideally, one would like to see the percentage of low impact papers as low as possible and the percentage of high impact papers as high as possible. For this period, CFHT has the third lowest percentage of low impact papers and the highest percentage of high impact papers. This is the first time recently that anyone but Keck has the highest percentage of high impact papers.



30 years ago

1978 was an important year for CFHT. The telescope structure was dismantled and crated for shipping. It left La Rochelle on 28 July and arrived in Kawaihae on 12 September, and at the end of the year the reassembly in the dome was well under way. The Meudon Project Office closed in June; in October, most of the staff was finally working in the same place for the first time in the history of the project. Negotiations started for the establishment of the permanent headquarters of the Corporation on private land in Waimea next to State land on which UH plans to construct the common services for users of Mauna Kea. UKIRT contemplates the purchase of adjacent land for its headquarters.

Science Highlights of 2008

Detecting Type IIn SuperNovae at high redhsift (z~2).

Type IIn supernovae are explosive, highly luminous events that result from the core collapse of massive stars after exhausting their nuclear fuel.

While most supernovae, like Type Ia, have a high UV extinction that prevents them to be detected at high redshift in optical domain, the Type IIn supernovae are the brightest supernovae in the rest frame Far UV, making them observable with deep optical surveys up to high redshift (z~2).

Based on this unique property, a preliminary analysis by J. Cooke (2008, ApJ 677, 137) shows that optical surveys down to r=27 can detect the FUV emission of roughly eight z>2 Type IIn supernovae /deg^2/yr (observed-frame).

The team, lead by J. Cooke, has used the CFHTLS Deep Survey to monitor the flux variability of a galaxy population at z~2, based on well proven color-selection technique. They have found four z~2 Type IIn supernovae in the data analyzed to date. The photometry of one of the candidate is shown in Fig 1.

They undertook a spectroscopic campaign at Keck that uses again the nice properties of Type IIn supernovae with extremely bright optical and FUV emission lines, which remain for years after the event.

They recently announced the spectroscopic confirmation of one candidate (SN 234161) at z=2.013 (AAS, 2009), with a second (SN 19941) found at z=2.357 shortly afterward. Both of these are the highest redshift supernovae ever detected.

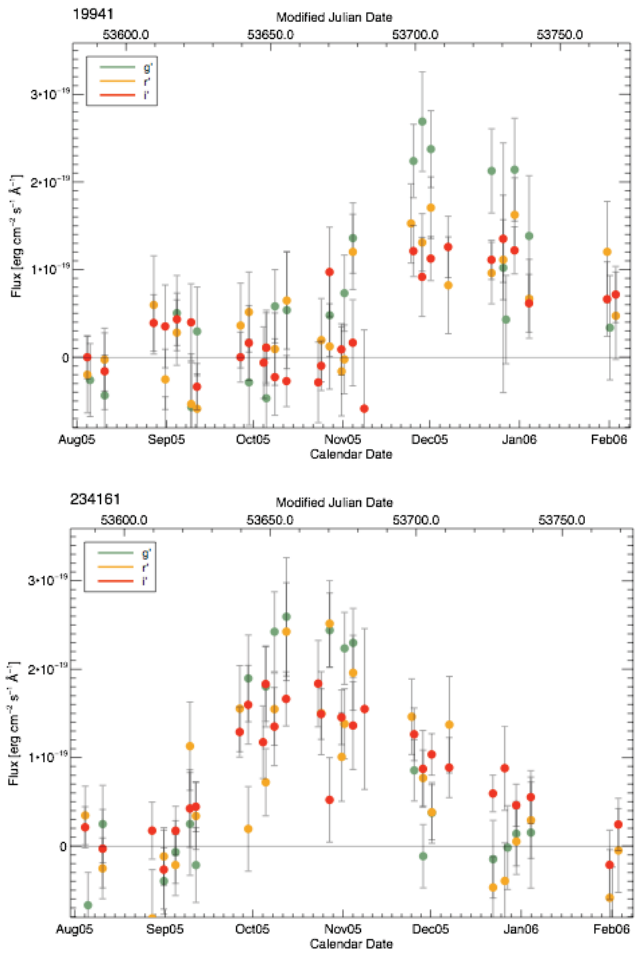


Fig 1 *- Light curves of the two z>2 Type IIn supernovae observed in CFHTLS with Megacam in g, r, and i filters over a 6 month period*

Because they are linked to massive stars, they are sensitive probes of ongoing star formation in galaxies and should provide good constraints on the upper-end of the initial mass function at high redshift.

This exploratory work with CFHTLS opens the door for deeper investigations with future surveys such as LSST and TMT which should find a huge number (~40,000 over ten years) of these SNe at z~2 and make detections out to z~6.

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Exploring the physical properties of galaxies in the CFHTLS-Deep

Measuring the star formation activity, the build-up of stellar mass in galaxies with cosmic time and its link with the way galaxies are distributed are critical steps to understand the processes of galaxy formation and evolution in the ΛCDM framework of structure formation. The CFHTLS-DEEP combines the two ingredients (depth and area) for such investigations in addition to all the ancillary data available (VVDS-spectroscopy, COSMOS-HST, GALEX, SPITZER), that cover the entire wavelength domain of stellar light.

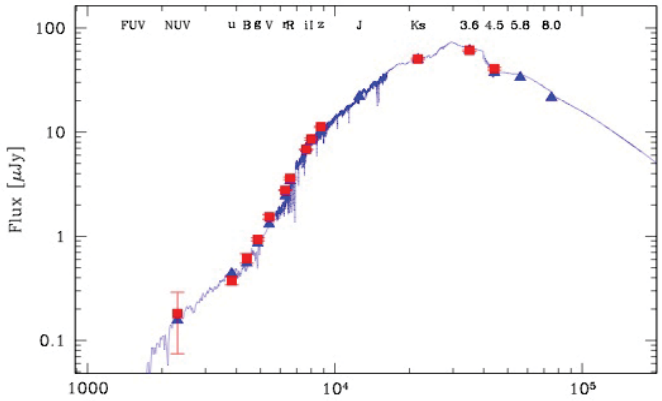


Fig 2: *Example of a galaxy SED fitting based on photometry from Far UV (GALEX) to Mid-IR (SPITZER). Red points are observations, blue points are the model.*

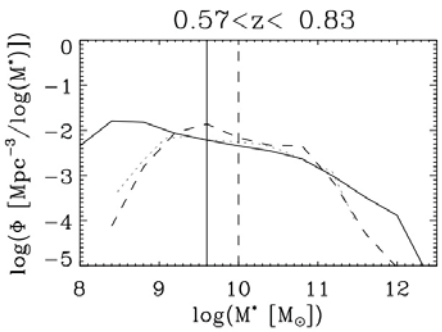


Fig. 3 *- Observed mass function at z~0.7 (solid line) compared to the predicted one (long dashed line)*

Using all this information and accurate photometric redshifts, Walcher et al. (2008, A&A 491,713) have extracted the physical properties (SFR, Mass, dust attenuation) for ~90000 galaxies up to z~1.2, by comparing with the a large library of models with stochastic star formation from Bruzual & Charlot (2007). An example of SED fitting is shown in Fig 2. By using the individual estimate of SFR and Mass, they predict the evolution of the observed mass function at z~1 down to z~0.7 and compare with the one observed at this redshift (see Fig 3).

The prediction is not estimating well the density of high/intermediate masses. They interpret this apparent discrepancy as a signature of major and minor mergings. This approach provides an indirect way for testing the hierarchical formation of galaxies.

Constraining the low-mass end of the IMF with WIRCAM

The universal Initial Mass Function is a fundamental ingredient in astrophysics to understand the conversion processes of gas in stars, down to planets. The WIRCAM instrument is well suited to investigate the role of low mass objects as shown by recent results obtained with two ongoing WIRCAM programs.

Measuring the dynamical masses of ultra-cool binaries

A model independent estimate of the mass of brown dwarfs is a difficult task. To overcome this limitation, a team lead by T. Dupuy has undertaken a large campaign of observations with CFHT and Keck to measure the dynamical masses of a large sample of ultra-cool binaries.

Those systems have been observed on a time baseline of a year or more with the WIRCAM camera in order to measure their parallaxes. Such observations greatly benefit from the high seeing quality of the Mauna Kea and the queue scheduling offered at CFHT. As a result they are able to measure the parallaxes to 1-3 milli-arcsec, which provides distance measurement accuracies of 3-5%.

In parallel, the orbits of these systems have been monitored with the Laser Guide Star Adaptive Optics (LGS AO) on Keck. The precise distances from the parallaxes and the orbit periods provide a precise

measure of the dynamical masses of each binary system. Preliminary results have been presented at AAS (Dupuy et Liu, AAS 2009) and the derived properties of these low-mass binaries will provide constraints on brown dwarf formation theories.

These results are a good illustration of the synergy between medium and large telescope facilities.

Discovery of M_{jup} T-dwarfs in a young Star Forming Region

A team lead by J. Bouvier has conducted a systematic search for planetary mass objects (a few M_{jup}) in the young (T~3Myr), nearby (d~340pc), star forming region IC348, to constrain the low-mass end of the IMF.

Wide field observations of this region have been obtained in zJHK and narrow bands (CH_4-off and CH_4-on). These narrow bands are used to detect methane absorption bands characteristic of the cool atmosphere of T-dwarfs (see Fig 4). In Burgess et al. (arXiv0810.2683), they reported the discovery of 4 T-dwarf candidates of which 3 should lie inside the IC348 star forming region. Comparison with models suggest spectral types between T3-T5 or later and masses of a few M_{Jup}. Those are the first evidence of the existence of very low mass objects in star forming region.

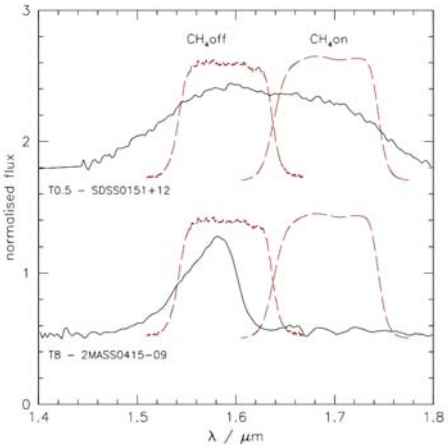
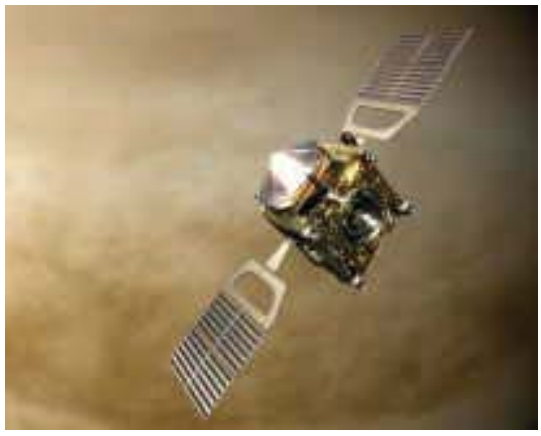


Fig. 4 *- Selection of T-dwarfs based on CH_4-off and CH_4-on filters where the latest one is centered in the methane absorption band allowing to identify the coolest T-dwarfs. A comparison between T0.5 (hotest) and T8 (coolest) spectra are shown to illustrate the method.*

The Solar System, from Venus to distant Icy Bodies, with ESPaDOnS and WIRCam

Venus winds



Venus is the brightest planet in the Earth's sky and our close neighbor, although many of the dynamical processes causing a zonal, retrograde super-rotation of its atmosphere and the time variability of the mesospheric wind regimes (70-120 km) remain poorly understood.

Renewed interest in measuring the winds at clouds top from the ground has emerged in the course of the Venus Express mission as well as recent reanalysis of Galileo NIMS near-infrared observations and SSI images (Limaye, 2007; Peralta et al., 2007). On Venus Express, atmospheric circulation at 70 km (as well near 50 km in the near-infrared) is being measured from cloud tracking by both VIRTIS-M and VMC (Markiewicz et al., 2007; Sanchez-Lavega et al., 2008). However, winds derived in this manner do not necessarily trace the true circulation. They may instead represent the phase speed of a condensation wave - as in the case of orographic clouds which remain fixed to mountain tops regardless of the wind velocity. Only ground-based high resolution spectroscopy may provide direct wind velocity measurements, at an accuracy of about 5 ms-1, using visible Fraunhofer lines scattered by Venus' cloud tops (Widemann et al., 2007).

With ESPaDOnS, the complete optical spectrum, from 370 to 1050 nm, is collected over 40 spectral orders in a single exposure at a resolution of about 80,000. The Doppler velocities are modeled using kinematical templates for the zonal wind: (1) solid rotation with v zonal = v equator x cos (latitude), (2) uniform retrograde velocity, v zonal = v equator. Both models are explored within latitudinal range 60S-60N (Fig. 5). Once the best fit is obtained, we define the acceptable domain and also test alternate models, including the combination of a zonal and an additional meridional circulation. The 2007 results obtained at CFHT over four distinct days revealed retrograde The agreement with our results would confirm the usual premise that cloud motion does track actual, instantaneous winds (Widemann et al., 2008).

ESPaDOnS spectra also contains a number of CO2 visible bands at 705.6, 710.7, 716.3, 782.0, 788.3, 868.9 and 1036.2 nm, which were simultaneously observed for the first time in 2007, in particular the 2 nu1 +5 nu3 triad, which had not been previously observed on Venus; besides a spectroscopic analysis of this band, they can be used to derive wind measurements in CO2 bands and constrain the vertical wind shear above clouds top, as well as independent constraints on measured winds altitude using bands rotational temperature.

For more information, see Wideman et al (2007) Planet. Space Sci. Special Venus Issue 2 (55), 1741–1756, and Widemann et al (2008) Planetary and Space Science, 56, 1320-1334

Monitoring the Pluto's atmosphere

An observing program of stellar occultations by Pluto and its satellites has been pursued in 2008. This program started in 2002 at CFHT, and revealed a two-fold increase of Pluto atmospheric pressure between 1988 and 2002 (Sicardy et al., 2003). Various occultations observed in 2006 and 2007 did not reveal any further increase in pressure. Pluto occultations have been successfully observed, one on 22 June 2008 (with five positive detections from Australia) and one on 24 June 2008 (with one positive detection from CFHT & WIRCam (Fig.6)). Furthermore, one positive observation of a Charon occultation has been achieved on 22 June 2008 from La Reunion Island. It allowed to monitor the evolution of Pluto's positional offset with respect to the DE413 barycentric ephemeris since 2005, showing in particular a linear trend and an offset in declination of more than +0.1 arcsec in 2008.

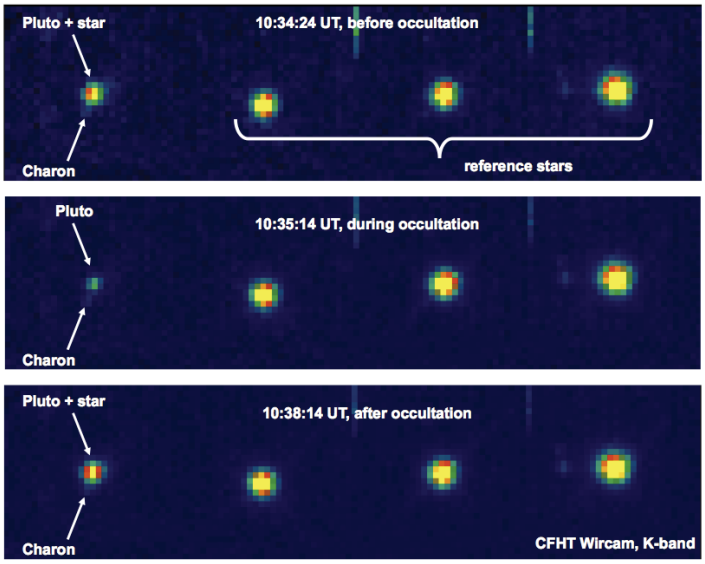


***Fig. 6** – The occultation of a star by Pluto observed at CFHT/WIRCAM in K-band on June 24, 2008, shown here on the left with a subset of nearby comparison stars, has revealed that surface atmospheric pressure on Pluto has been stabilized at its 2006-2007 level, after a three-fold increase between 1988 and 2002.*

Data have also been used to monitor the evolution of Pluto's atmospheric pressure since 2002, in the context of the New Horizons mission to the Pluto-Charon system, which will fly by the two bodies in July 2015. They revealed that surface atmospheric pressure on Pluto has been stabilized at its 2006-2007 level, after a three-fold increase between 1988 and 2002. As models predicting a collapse of Pluto's atmosphere into ice as the planet increases its distance to the Sun are poorly constrained by thermochemistry and albedo models, new sporadic increases, as well as sudden decreases cannot be excluded in the coming years.

For more information, see Sicardy et al (2003), Nature 424, 168-170 and Sicardy et al (2008), Bull. Am. Astron. Soc. Vol. 40, n°3, p. 461.

Four new Large Programs

With the CFHTLS observations ramping down in 2008B to come to an end in early 2009, it was time to issue a call for Large Programs to cover the [2009-2012] period. A total of 12 proposals were submitted and four of them were selected in May by the Scientific Advisory Council after review by an panel of experts specially formed for the occasion.

The Pan-Andromeda Archaeological Survey (PandAS) – PI McConnachie

Instrument: MegaPrime. 226 hours, spread over three B semesters [2008B-2010B]

The Lambda-Cold Dark Matter hierarchical paradigm is robust to large scale observables, and it is on galactic scales that our understanding of the cosmological evolution of matter is most incomplete. Many of the predicted features of galaxies, such as faint satellites and diffuse stellar haloes, are extremely low surface brightness (> 31 mags per sq.arcsec). The Milky Way, M31 and M33 are therefore the only three large galaxies in the Universe which can currently provide robust tests of, and constraints on, many fundamental predictions of galaxy formation models. The Pan-Andromeda Archaeological Survey (PAndAS) will obtain g and i imaging of over 300 sq.degrees of the M31/M33 sub-group. PAndAS will provide the first panoramic view of galaxy haloes over a volume of ~15 million cubic kpcs, and will be complete to 32 - 33mags per sq. arcsec. PAndAS will also provide the deepest and most complete panorama of galaxy haloes available, and will be used to compare to and constrain cosmological models of galaxy formation over an order of magnitude in halo mass. It will be unrivaled by any other extra-galactic wide field survey and will become a benchmark study of near field galaxy formation. The legacy value of PAndAS - for M31, M33, the Local Group, dwarf galaxies, globular clusters, stellar populations, galaxy formation and MW structure - is immense. It will become the primary reference dataset for all subsequent studies of the stellar populations of these galaxies, and will remain so into the era of Thirty Meter Telescopes and beyond. This survey is only possible for the M31/M33 sub-group, and it is only possible using the unique capabilities of CFHT/MegaPrime.

The Next Generation Virgo Cluster Survey (NGVS) – PI: Ferrarese

Instrument: MegaPrime. 771 hours, spread over four A semesters [2009A-2012A]

The Virgo Cluster is the dominant mass concentration in the local universe and the largest collection of galaxies within ~35 Mpc. As the most thoroughly studied cluster in the universe, it is the target of many ongoing and planned surveys at X-ray, UV, IR, submm and radio wavelengths. However, the best existing optical survey of the Virgo Cluster — the photographic Virgo Cluster Catalog of Binggeli et al. (1985) — is now nearly a quarter century old and hopelessly out of date by modern standards. The Next Generation Virgo Cluster Survey will be carried out capitalizing on the wide-field imaging capabilities of MegaPrime: a programme to survey the cluster from its core to virial

radius, in u*g r i z , to a point-source depth of g ~25.7 mag and a corresponding surface brightness of g ~ 27.7 mag arcsec-2. The NGVS will completely supersede all existing optical studies of this uniquely important system, and, by leveraging the vast amount of data at other wavelengths, will allow us to address a wide range of fundamental astrophysical questions, including: the faint-end shape of the luminosity function, the characterization of galaxy scaling relations over a factor 107 in mass, the cluster/intracluster medium/galaxy connection, and the fossil record of star formation and chemical enrichment at z~0. Numerous ancillary projects — from a survey of the Galactic halo to cosmic shear measurements — will also be enabled. The NGVS will be a lasting legacy of CFHT: not only will it be the definitive study of baryonic substructures in a low-z cluster environment, but it will yield the benchmark observational database against which the next generation of hierarchical formation models will be tested.

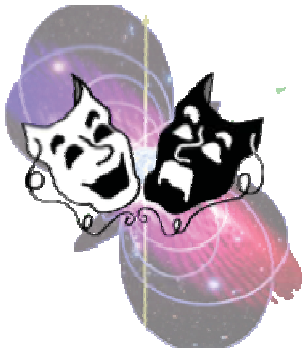
Magnetic Protostars and Planets (MaPP) – PI: Donati

Instrument: ESPaDOnS. 690 hours, spread over 9 semesters.

MaPP aims at studying the impact of magnetic fields on the physics of protostars and accretion discs, and thus on the formation of stars and planetary systems. Youth is indeed the period in the life of non-degenerate stars at which magnetic fields play a key role, through the accretion/ejection processes involved in the collapse of the protostellar cloud. In particular, the study will focus on the core regions of protostellar accretion discs, the newly born star and their potential close-in giant planets. It will be the first spectropolarimetric survey on a significant sample of low-mass protostars, including a few bright protostellar accretion discs; from this survey, the large-scale magnetic field topologies of protostellar objects using tomographic imaging techniques will be studied. By comparing these results to the predictions of new theoretical models and MHD simulations, MaPP will answer several major open questions on star formation and produce updated models incorporating the effect of magnetic fields. MaPP is part of the international MagIcS initiative; all data collected with MaPP will thus directly feed the MagIcS LEGACY database.

Magnetism in Massive Stars (MiMeS) – PI: Wade

Instrument: ESPaDOnS. 640 hours, spread over 9 semesters



Massive stars are those with initial masses on the main sequence above about 8 solar masses, leading to core-collapse (or pair-instability) supernovae. They dominate the ecology of the Universe as "cosmic engines" via their extreme output in radiation and particles - not only as supernovae, but also during their entire lifetimes - with far-reaching consequences. Although the existence of magnetic fields in massive stars is no longer in question, our knowledge of the basic statistical properties of massive star magnetic fields is seriously incomplete. There is a troubling deficit in our knowledge of the scope of the influence of fields on massive star evolution, and almost no empirical basis for how fields modify mass loss. This proposal represents a consensus effort by an international team of recognized researchers who have compiled a strategic sample of sources to address these outstanding issues. The basic aim of this Large Program is to exploit the unique characteristics of ESPaDOnS obtain critical missing information about the poorly-studied magnetic properties of these important stars, to confront current models and to guide theory. The general scientific objectives are: 1. To identify and model the physical processes responsible for the generation of magnetic fields in massive stars; 2. To observe and model the detailed interaction between magnetic fields and massive star winds; 3. To investigate the role of the magnetic field in modifying the rotational evolution of massive stars; 4. To investigate the impact of magnetic fields on massive star evolution, and the evolution of the fields themselves. In particular the connection between magnetic fields of non-degenerate massive stars and those of neutron stars will be explored, with consequential constraints on stellar evolution, supernova astrophysics and gamma-ray bursts.

Brazil and CFHT sign a Collaborative Agreement

The basic mission of the *Laboratório Nacional de Astrofísica* (LNA), as one of Ministry of Science and Technology research units, consists in providing astronomical infrastructure for the Brazilian astronomical community. The LNA was therefore the partner of choice in Brazil for an agreement with CFHT, thus offering to Brazilian astronomers access to our telescope. This agreement follows the model pioneered with the collaboration with South Korea and well established with the ongoing agreement with Taiwan, which was extended at the end of 2007 for a second term of three years.

Observatório do Pico dos Dias

LNA runs an observatory on Brazilian soil, *Observatório do Pico dos Dias* (OPD). Brazil is a partner in the Gemini Observatory and therefore already present on Mauna Kea. It is also part of a consortium with the National Optical American Observatory, the University of North Carolina and Michigan State University around the SOAR (SOuthern Observatory for Astrophysical Research) Telescope, a 4.1 m diameter alt-az optical telescope located at Cerro Pachon, in Chile (as Gemini South) and designed to work from the atmospheric cut-off in the blue (320 nm) to the near infrared with excellent image quality.

SOAR Telescope

With this Agreement, Brazilian astronomers will use CFHT 5 to 10 nights a semester over three years (2009B to 2012A). CFHT is very happy to welcome Brazil and to extend its users' base to South America.

New instrumentation for 2013 and beyond

Following the call for ideas for new instruments for 2013 and beyond, the submission of four concepts of instruments and their review by CFHT and its Scientific Advisory Council, the Board of Directors decided at its 2008 fall meeting to move one instrument, SPIRou, to a Phase A study to be completed in May 2009 and to support further studies on the `IMAKA concept. The proposers of a third instrument, SITELLE, were encouraged to seek appropriate funding and develop SITELLE as guest instrument in collaboration with CFHT staff.

SPIRou

SPIRou is a near-infrared spectropolarimeter proposed as a new-generation CFHT instrument (to be implemented in 2014). Technically speaking, SPIRou is essentially a nIR version of ESPaDOnS/NARVAL with improved RV stability (1 m/s level), and consists of a high-resolution cryogenic échelle spectrograph fiber-fed from a Cassegrain achromatic polarimeter. It yields nearly complete spectral coverage in the JHK bands (i.e. from 0.9 to 2.4μm) at a spectral resolution of 50,000.

© Rob-Vel, Dupuis

The main science goal is to attempt detecting Earth-like planets in the habitable zone of low-mass stars and to investigate the role of magnetic fields in the star/planet formation process.

The PI of SPIRou is J.-F. Donati, with the support of the *Laboratoire Astrophysique de Toulouse-Tarbes* and the *Observatoire Midi-Pyrénées*. Donati has been the PI of ESPaDOnS, one of the three main instruments currently in operation at CFHT.

´IMAKA

´IMAKA (a Hawaiian word for *watchtower, lookout, observation point*) stands for "**I**maging from **M**aun**A** **K**e**A**" with an atmosphere corrected 1 square degree optical imager. The goal of this project is to achieve exquisite image quality over the largest possible field of view, with a goal of a FWHM of not more than 0.3" over a square degree field in the optical domain. The characteristics of the turbulence of Mauna Kea, a very thin ground layer with excellent free seeing allows very wide fields to be corrected by GLAO and would make such an instrument unique. The Ground Layer AO will correct the turbulence common to the entire field. Applications are numerous, from z>7 galaxy searches, high redshift supernova cosmology, weak lensing and galaxy and stellar evolution to extrasolar planets and sub-stellar astrophysics.

´IMAKA was proposed initially by Ray Carlberg and Harvey Richer, and the studies envisioned for 2009 and 2010 will involve a large team in Canada, France and Hawaii working with CFHT to tackle the main challenges of this exciting project and better characterize the turbulence profile at CFHT from the dome floor up.

SITELLE

SITELLE (**S**pectromètre **I**mageur à **T**ransformée de **F**ourier pour l' **E**tude en **L**ong et en **L**arge de raies d'**E**mission) is a wide-field imaging Fourier transform spectrometer, capable of obtaining the visible (350 nm – 950 nm) spectrum of every source of light in a field of view of 14.4 arc-minutes, with 100% spatial coverage and a spectral resolution ranging from R = 1 (deep panchromatic image) to R = 10^4 (for gas dynamics). SITELLE will cover a field of view 100 to 1000 times larger than traditional integral field spectrographs, such as GMOS-IFU on Gemini or the future MUSE on the VLT. It is a legacy from BEAR, the first imaging FTS installed on the CFHT and the direct successor of SpIOMM, a similar instrument attached to the 1.6-m telescope of the Observatoire du Mont-Mégantic in Québec. SITELLE will be used to study the properties of comets, the structure and kinematics of HII regions and ejecta around evolved stars in the Milky Way, emission line stars in clusters, abundances in nearby gas-rich galaxies, and the star formation rate in distant galaxies.

The PI of SITELLE is Laurent Drissen (Université Laval, Québec).

The Observatory Automation Project

2008 marked the first full year of OAP, aimed in a first phase at allowing remote observing from the CFHT headquarters in Waimea without anybody at the summit. The rationale for such an endeavor, challenging on a facility designed 35 years ago, is two-fold:

(1) improve the remote sensing capabilities on all critical sub-systems at the summit facility. This will allow to monitor these sub-systems better, to watch their status remotely and generate alerts which will often prevent technical failures or, when they happen, to diagnose their source from a distance without having to send technical staff to the summit;

(2) operate the telescope at night with only one person running the show, merging the duties and responsibilities currently handled by two persons (an Observing Assistant and a Queue Observer) into the duties of a single person on a new Remote Observer position.

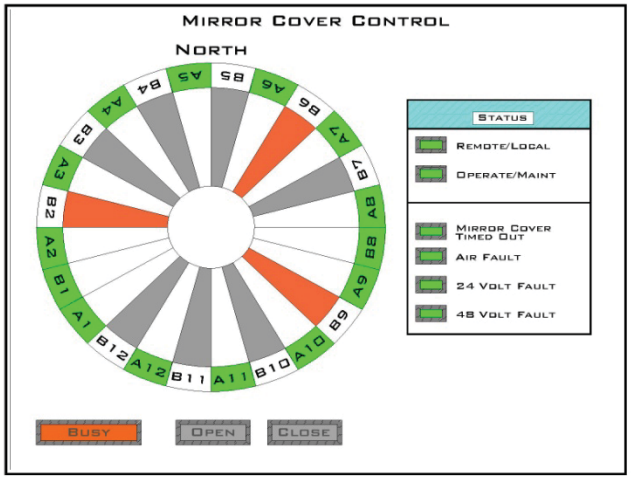
This ambitious project will be developed over 2009 and 2010 and should be operational in early 2011. It has been divided into 20 sub-projects, each of them following the traditional cycle of reviews, from Conceptual Design to Final Design. From replacing the eyes and ears of the Observing Assistant opening or closing the shutter in the dome, to monitoring the oil pressure in hydraulics of the telescope or let the facility shut down by itself if communication is broken between the summit and Waimea, there are indeed many things to take care off! The tables below list most of the items needing to be addressed (the "Requirements") and the corresponding sub-projects.

Requirements

- Building to Dome Communications
- Dome Shutter
- Mirror Covers
- Telescope Hydraulics
- Dome Hydraulics
- Locking Pins
- f/8 Focus
- Mirror Chilling
- Backup Network
- Diagnostic Gateway
- Improve Computing Reliability
- Waimea Observing Infrastructure
- Dry Air System
- Audio-Video Monitoring
- Fire Alarm Systems
- Building Lights
- Audio-Video Recording
- Remote Summit/Waimea Paging
- Floor Chillers
- Dome Louvers
- Windscreen
- Cass. Guide Camera Control
- Autonomous Shutdown For Power Failure
- Panel F Restart
- Network Outage Monitor with Possible Autonomous Shutdown
- Remotely Power Cycle TCS VME
- Helium Bypass Valve
- Computer Room Cooling System
- Weather Sensing
- Front Door Monitoring
- Intruder Detection and Control

Sub-Projects

- Audio and Video
- Detect Visitors
- Dome Hydraulics
- Dome Shutter
- Dry Air System
- Fire Alarm System
- Floor Chillers
- Helium Bypass Valve
- Mirror Chilling
- Mirror Covers
- Panel F Replacement
- PLC Infrastructure
- Remote Control of Lights
- Remote Operating Environment
- Remote TCS
- Software Infrastructure
- Standard Operating Procedures
- Telescope Hydraulics
- Weather Sensing
- Windscreen



buttons instead of clicking on a GUI…

An image from the mirror cover monitoring camera on the right shows the cover opening with most of the leaves closed, three already open and three moving.

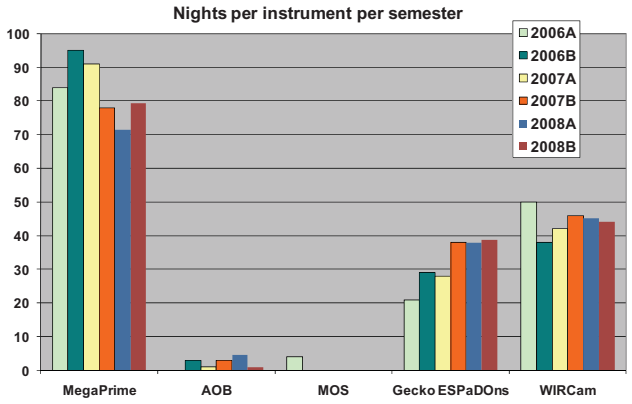
Each of the many components of the projects will be used as soon as it is completed: a good way to actually extensively test most of the features while observing at the summit before they are used really remotely from Waimea.

The mirror cover control has been one of the first to come on line and to be used for regular observations! The figure below on the left shows the display available to the operator. The mirror is actually opening. Already opened leaves are green, while the ones still closed are grey. Those moving are in orange…

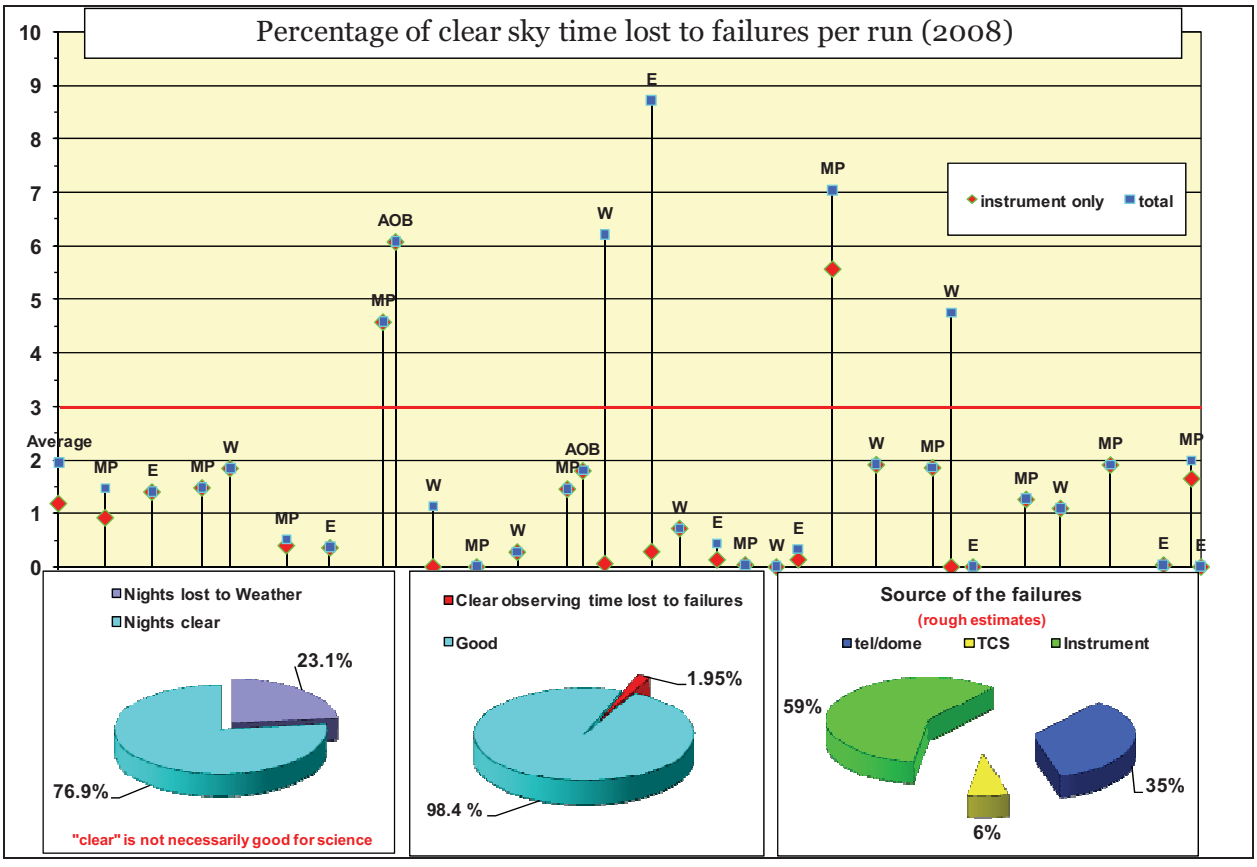
Each leaf had to be instrumented so that its status could actually be known remotely. In addition a camera was added to be able to watch what is happening, ending with actually more to be seen and more checked than when an operator was opening or closing it by pushing

Operation Report

The graph opposite shows the number of nights scheduled for PIs, the CFHTLS and Large Programs over the six semesters of 2006, 2007 and 2008. Three instruments, MegaCam, WIRCam and ESPaDOnS, took most of the observing time, with the occasional runs on AOB or MOS in Fabry-Pérot mode. This three-instrument regime will endure over the coming years. For the first time in its history, CFHT observed in QSO for all of the 2008 science nights, but for an occasional short run for AOB.



The graph below summarizes the observing time losses due to instrument and telescope failures. The goal for 2008 was to limit the losses to a maximum of 3 % of clear weather. The operation of the instruments has been very smooth all along the year, thanks to the maintenance program now covering all the know issues of MegaCam and its sub-systems (shutter and filter jukebox). WIRCam and ESPaDOnS did not bring any unexpected significant problem. The telescope and all the ancillary systems at the summit behaved well too. While it has been a relief for the instrumentation group after the two big failures of 2007, it has been also very encouraging for all to see that a 2% ultimate goal was not necessarily out of reach, even if it looked like a dream when the GAP was conceived at the end of 2004.



Only 1.95% of the clear observing time was lost to problems, making the 2.5% goal for 2009 reachable. The Observatory Automation Project will actually help to reach this goal as it provides for more remote monitoring of most of the observatory components, therefore mitigating the risk of failures.

Outreach

2008 has been another active year for CFHT Outreach. Most of the activities are still the responsibility of the members of the Outreach Group, but the entire staff of CFHT responds with great dedication whenever they are asked for their assistance.

Star Gazing Parties:
December 5th -Christmas Star Party

Fairs and Festivals:
January 26th – Onizuka Day at UH Hilo
February 15th – West Hawaii Intermediate/High School Science Fair (judging)
February 16th – East Hawaii Intermediate/High School Science Fair (judging)
April 12th – Healthy Keiki Fest Waimea
April 26th – Earth Day Waimea
May 3rdst – Astro Day Hilo, CFHT posters and calendars were very popular as usual.
November 14th – Waimea Country School Science Fair
November 21st – Girls Exploring Math and Science Day

CFHT HQ and Summit Visits
June 4th – Akamai Student Internship
November 10th – Canadian High School (with Waimea Talk)
December 8th – Canadian High School
…and numerous silent action summit tours

Public Talks and School Visits:
January 31st – Waimea Montessori School
May 22-23rd – Waimea Middle School
June 21st – Sky Tonight talk at ‘Imiloa
June 13th – Kahilu Theatre Summer Camp
November 18th – Waimea Middle School

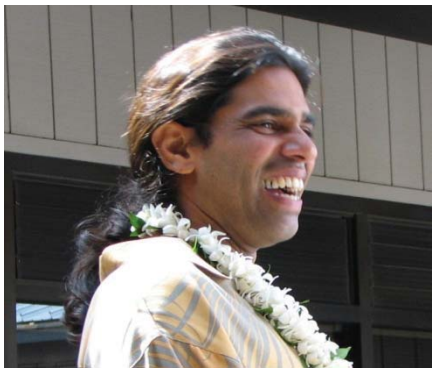
Special Events:
January 14th – CFHTLS data added to the ‘Imiloa Planetarium’s 3D data set
January 16th – Hawaiian Starlight Keiki showing at Kahilu Theatre
December 10th – Family Library Night
December 14th – *Hawaiian Starlight* movie showing at Kahilu Theatre with an exhibition of prints on canvas of CFHT images in the Kahilu Theatre Gallery.

Miscellaneous:
- CFHT continues to co-host (with Keck) the West Hawaii Astronomy Club meetings every other month
- October 11th – Visitor Information Station Volunteer Appreciation Dinner
- Two staff members were active members in the Waimea Robot Club while it was active.
- October 25/26th – Participation of a CFHT team (17 members) in the Relay for Life, Waimea.

The Personal Touch: three departures and an arrival!

Pierre Martin

Pierre Martin joined CFHT as Canadian Resident Astronomer in 1997. He was quickly involved with the CFHT Queued Service Observing project, thanks to his experience with the ESO NTT. Following the departure of Dennis Crabtree, who initiated QSO at the observatory, Pierre took over the responsibility of the project and led it to a mature and very efficient mode of observing which has contributed significantly to the success of the CFHT Legacy Survey and other ambitious projects carried on with the wide-field imagers MegaCam and WIRCam, and ultimately with ESPaDOnS since early 2008. QSO at CFHT is definitely the best queue mode currently available of any ground-based telescope! When Christian Veillet left his Senior Resident Astronomer (SRA) position in 2003 to become CFHT's Executive Director, Pierre replaced him on what became the Director of Science Operation position. In this function, he also efficiently led the Astronomy Group. Pierre left CFHT to become the director of the WYIN telescope, a natural step after a very successful career within CFHT.



Rohendra Attapatu

Rohendra Attapatu ("Ro") left CFHT in early 2008 after 14 years at the observatory. Ro served as operations engineer, in charge of the Operation Group and leading the efforts of his group toward a preventive maintenance oriented mode which has been extremely successful at reducing the down time of the facility. His intimate knowledge of the telescope and its sub-systems and the breadth of his skills will be missed. In addition to his expertise, Ro has been a highly appreciated colleague whose personality has largely contributed in the smoothness and efficiency of the summit operations as well as the development of the MegaCam and WIRCam projects which brought a heavy load to the summit crew. Ro is now enjoying the Half Moon Bay area, where he helps the planet to stay cool in a company providing businesses with efficient and alternative energy solutions…

Rosemary Alles

Rosemary Alles left CFHT in April after over 13 years of service. As a software engineer, Rosemary was involved in many projects ranging from telescope control systems to ESPaDOnS data processing. She also started the recycling program at CFHT and actively volunteered for environmental and community organizations. She has accepted a position at Jet Propulsion Laboratories in Pasadena, California.

Steve Bauman

Steve Bauman came to CFHT in November from Steward Observatory/Mirror Lab and the MMT (Multiple Mirror Telescope) in Tucson, AZ. For the past five years as a Principal Mechanical Engineer he has worked on the 6.5m LOTIS Collimator project which will be used to verify satellites prior to launch at Lockheed Martin Space Systems in Sunnyvale, CA. He has a Master's degree in Mechanical Engineering where he studied Solid mechanics and Reliability. Steve is excited about learning the ins and outs of maintaining the telescope as well as designing new instruments and automating opto-mechanical systems. When he is not working Steve enjoys playing basketball, hiking, biking or traveling, hoping to add surfing to the list.

Current Staff at CFHT

Akana, Moani	Administrative Specialist
Albert, Loïc	Resident Astronomer
Arnouts, Stéphane	Resident Astronomer
Arruda, Tyson	Mechanical Technician
Babas, Ferdinand	Assistant System Administrator
Baril, Marc	Instrument Engineer
Barrick, Gregory	Optical Engineer
Bauman, Steve	Operations Engineer
Benedict, Tom	Instrumentation Specialist
Bryson, Elizabeth	Librarian
Burdullis, Todd	Senior Service Observer
Cruise, William	Telescope Control Systems Eng.
Cuillandre, Jean-Charles	Staff Astronomer
Dale, Laurie	Administrative Specialist
Devost, Daniel	Resident Astronomer
Devost, Michelle	Data Analyst
Draginda, Adam	Service Observer
Elizares, Casey	Mechanical Technician
Fischer, Linda	Resource Specialist
Forshay, Peter	Service Observer
Gajadhar, Sarah	Electrical Engineer
George, Teddy	Observing Assistant
Ho, Kevin	Instrumentation Manager
Lai, Olivier	Resident Astronomer
Laychak, Mary Beth	Service Observer
Look, Ivan	Mechanical Design Engineer
Luthe, John	Observing Assistant
Mahoney, Billy	Data Base Specialist
Manset, Nadine	Resident Astronomer
Matsushige, Grant	Sr. Instrumentation Specialist
Mizuba, Les	Detector Specialist
Morrison, Glenn	Resident Astronomer
Potter, Sharon	Safety Specialist
Roberts, Larry	Electrician
Rodgers, Jane	Finance Manager
Sabin, Daniel	Mech. Designer / Instrument Maker
Salmon, Derrick	Director of Engineering
Stevens, Mercédes	Administrative Assistant
Taroma, Ralph	Observatory Facility Manager
Teeple, Doug	System Programmer
Thomas, James	Computer Systems Engineer
Veillet, Christian	Executive Director
Vermeulen, Tom	Systems Programmer
Ward, Jeff	Detector Engineer
Warren, DeeDee	Director of Finance & Administration
Wells, Lisa	Observing Assistant
Withington, Kanoa	Software Manager
Wood, Roger	Automotive Mechanic
Woodruff, Herb	System Administrator
Woodworth, David	Senior Observing Assistant
Zelman, Rachael	Service Observer

Comings and Goings

Alles, Rosemary	Departure	Apr
Atapattu, Rohendra	Departure	Feb
Barrelet, Etienne	Visitor	Jan-Feb
Bauman, Steve	Arrival	Nov
Cockcroft, Rob	Student	Jun
Courteau, Stéphane	Visitor	Aug-Sep
Couture, Pierre	Student	May-Aug
Croll, Bryce	Student	Sep-Oct
Eilek, Jean	Visitor	Aug-Sep
Fedou, Pierre	Visitor	Nov + earlier
Ghislain, Patric	Visitor	Feb
Girard, Julian	Visitor	Jun
Haines, David	Visitor	Nov
Heinis, Sebastien	Visitor	Sep
Imai, Amber	Student	Jul
Juramy, Claire	Visitor	Jan-Feb
Lefloch, Emeric	Visitor	Nov
Lenoir, Benjamin	Student	Apr-Jul
Martin, Pierre	Departure	Aug
Owen, Frazier	Visitor	Aug-Sep
Perrin, Guy	Visitor	Nov
Petit, Véronique	Student	
Polak, Lucia	Student	Jul-Sep
Pritchett, Chris	Visitor	Mar-Apr
Repain, Philippe	Visitor	Jan-Feb
Roediger, Joel	Visitor	Aug-Sep
Schahmanche, Kyan	Visitor	Feb
Sick, Jonathan	Visitor	Aug-Sep
Whelan, David	Student	May-Jun

Financial Resources

The three Member Agencies supported the CFHT annual budget in 2008 as shown in the table at the right, in US funds. These contributions reflect a 3% increase over the prior year, in accordance with the Golden Age Plan.

Under a collaborative agreement with CFHT, the National Taiwan University remitted $250,548, as reimbursement for costs associated with its use of the Corporation's facilities. Other sources of funds included $16,774 from mid-level facility use credits, $22,800 from distribution of educational materials, and $101,340 in earned interest allocated to the contingency reserve fund.

Agency Contributions

NRC	3,044,783
CNRS	3,044,783
UH	706,036
Total	6,795,602

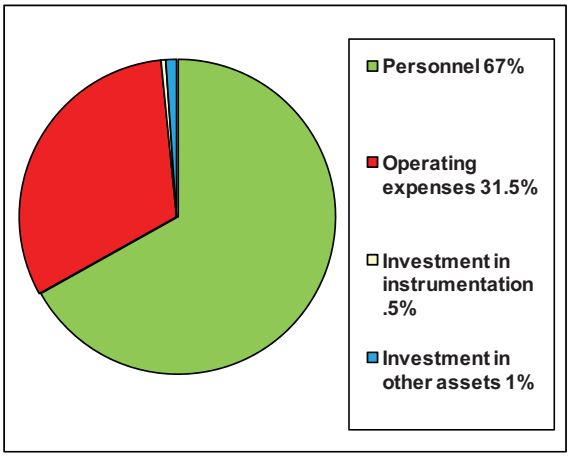
From the operating fund, expenditures were allocated to the areas listed in the table at right.

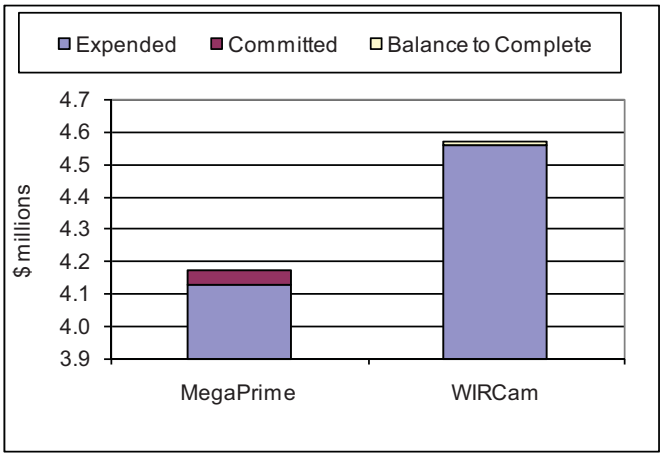
During the year, $37,899 were disbursed from the instrumentation fund for the current projects of the Wide-field Imaging Plan, which brings the total investment under this multi-year program to $10,266,687. The current appropriation and the portion committed to date are shown in 2008, 99.9% of total appropriations under the Wide-field Imaging plan were spent or committed.

Overall in 2008, resources from all CFHT funds were allocated to the categories of expenditures shown in the pie chart below.

Operating Fund Expenditures for 2008

Observatory facilities and operations	815,646
Base facilities and operations	928,548
Instrumentation	96,561
Science	80,930
Personnel	424,362
General expenses	5,170,370
Transfer from Reserve	(720,815)
Total Operating Fund Expenditures	6,795,602





CFHT Committees

Board of Directors (as of Dec.31, 2008) Executive Secretary to the Board of Directors: Mercédes M. Stevens

Claude Catala (F) - Vice-Chair	Observatoire de Paris
Jean-Gabriel Cuby (F)	Laboratoire d'Astrophysique de Marseille
Michael De Robertis (C) - Secretary	York University
Gregory G. Fahlman (C)	Herzberg Institute of Astrophysics
James Gaines (H)	University of Hawaii
Jean-Marie Hameury (F)	Institut National des Sciences de l'Univers
Robert A. McLaren (H) - Treasurer	University of Hawaii
Richard Normandin (C)	National Research Council Canada
Harvey Richer (C) - Chair	University of British Columbia
Daniel Rouan (F)	Observatoire de Paris-Meudon

Scientific Advisory Council & Time Allocation Committee Members

Pierre-Alain Duc (F) - Chair - TAC	Service d'Astrophysique - CEA
Christ Ftaclas (H) - TAC	University of Hawaii
Laura Ferrarese (C) - Vice-Chair - TAC	Herzberg Institute of Astrophysics
Jean-François Gonzalez (F) - TAC	Centre de Recherche Astronomique de Lyon
Cécile Gry (F)	Laboratoire d'Astrophysique de Marseille
Hendrik Hoekstra (C)	University of Victoria
Robert Jedicke (H)	University of Hawaii
Dae-Sik Moon (C) - TAC	University of Toronto
Denis Mourard (F)	Observatoire de la Côte d'Azur
Nicole St.-Louis (C)	Université de Montréal

CFHT Executive

Christian Veillet - Executive Director	DeeDee Warren - Director of Finance and Administration
Derrick Salmon - Director of Engineering	Daniel Devost – Director of Science Operations

Audit Committee

Bernard Adans (F)	Centre National de la Recherche Scientifique
Daniel Gosselin (C)	National Research Council Canada
Russell Miyake (H) - Chair	University of Hawaii
Peter Peacock (C)	National Research Council Canada
Hubert Rédon (F)	Centre National de la Recherche Scientifique

Contracts Review Committee

François Baudin (F)	Institut National des Sciences de l'Univers
Robert McEwen (C) - Chair	National Research Council Canada
Michel Rancourt (C)	National Research Council Canada
Gérard Vivier (F)	Institut National des Sciences de l'Univers
Duff Zwald (H)	University of Hawaii

(C) Nominated by the National Research Council Canada
(F) Nominated by the *Centre National de la Recherche Scientifique*, France
(H) Nominated by the University of Hawaii

Approved Programs 2008A

E = ESPaDOnS M = MegaPrime W = WIRCam A = AOB

Alecian	E	Characterisation of the magnetic field of the Herbig Be stars NGC6611 601
Allers	W	A survey for the new young brown dwarfs in Serpens and Ophiucus
Altmann	M	Creating astrometric and photometric calibration fields for GAIA
Bendjoya	W	Search of Organic Grains in Comet 6P/d'Arrest
Beuzit	A	Stellar multiplicity and extrasolar planet formation
Biller	W	A systematic survey for very young planetary mass objects
Bouvier	W	Isolated Planetary Mass Objects (IPMOs): nearing the end of the IMF
Cami	E	Line polarisation in optical emission bands of the Red Rectangle: Evidence for fluorescence excited in vibronic lines of complex molecules?
Catala	E	Characterisation of the magnetic field of the Herbig Be stars NGC6611 601
Cote	W	The Structure, Formation and Evolution of Galactic Cores and Nuclei: An HST-WIRCam Survey of Virgo Cluster
Cowie	W	A deep infrared survey of galaxies at z > 1.6
de la Chevrotière	E	Magnetic fields in Wolf-Rayet stars
Donati	E	Magnetospheric accretion on classical T~Tauri stars
Dupuy	W	Dynamical masses of brown dwarfs and low-mass stars
Durrell	M	Searching for Virgo's Intracluster Globular Clusters
Ferrarese	M	The Properties of Baryonic Substructures in a Hierarchical Universe: A Deep MegaPrime Survey of the Virgo Cluster
FLAGEY	W	An Explosive Discovery within the Eagle Nebula
Fulbright	E	Elemental Abundances and Kinematics of Very Metal-Poor RAVE Stars
Fullerton	E	Is the Wind of the Oe Star HD 155806 Magnetically Confined?
Geha	M	Turning the Tides on the Least Massive Galaxies in the Universe
Gu	E	CaII variation and magnetic fields of two late F-type stars: HD 179949 and HD 75332
Harrington	E	Optical pumping using spectropolarimetry of Wolf-Rayet stars
Harrington	E	Atmospheric distortion and tidel flows in hot binaries via spectropolarimetry
Harrington	E	Wind launching regions in Herbig Ae/Be stars
Heymans	M	A weak lensing study of the rich merging galaxy cluster Abell 2744
Hoekstra	M	A comprehensive study of dark matter and baryon stripping in galaxy clusters
Huang	M	Multi-band follow-up observations of Gamma-Ray Bursts detected by the Swift satellite
Hudson	M	u*g'i' Imaging of the Coma Cluster from the Core to the Virial Radius
Ibata	M	Completion of "What is the nature of the dark matter: cold or warm? Imprints on the tidal stream of Pal 5"
Ibata	M	Completion of ``The extended disks of galaxies: a new galactic component?''
Johnson	M	Characterizing the old, nearby galactic cluster Ruprecht 147
kavelaars	M	Orbital Structure of the High Inclination Components of the Kuiper Belt.
Kneib	W	WIRCam Deep Survey (WIRDS): Tracing the Evolution of Galaxies to z~3
Lagrange	A	Investigating low-mass companions around early type stars
Lai	W	Catching Collapse in Action - Deep Near-Infrared Imaging of Density Structure in Class -1/0 Sources
Landstreet	E	A spectropolarimetric survey of magnetic stars in open clusters: searching for links between magnetic fields and stellar evolution
Lemasle	E	The slope of the Galactic abundance gradient toward the inner and the outer disk
Lodieu	W	Testing the fragmentation limit: a methane imaging survey in the Upper Sco cluster to find 5 Myr-old T dwarfs
Ma	W	The mass-assembly history of galaxies in distant MACS clusters
Magnier	M	Deep astrometric reference field in the Gem-Ori-Tau region
Marois	A	Multiplicity at the top of the Main Sequence, a High-Angular Resolution Survey of Young A stars
McNamara	M	Weak lensing mass measurement of MS0735.6+7421: A cluster experiencing a powerful jolt.
Morin	E	Surveying the magnetic properties of M dwarfs
Morrison	M&W	CFHT hi-res & panchromatic imaging of galaxies of the richest galaxy clusters
Pello	W	WIRCAM Ultra Deep Survey (WUDS): Constraining the Star Formation Rate and the bright end of the Luminosity Function at z>7
Petit	M	Orbital Structure of the High Inclination Components of the Kuiper Belt.
Petit	E	Is the Sun a magnetic outlier?
Phan-Bao	E	Mapping the magnetic field topology in partly and fully convective stars
Rouan	M	Follow-up of the exoplanet program of the CoRoT satellite : confirmation of planetary transits and identification of *false positive*.
Sanders	W	Hawaii NIR imaging/spectroscopy of the HST-ACS COSMOS 2-deg^2 treasury field
Shkolnik	E	A spectroscopic survey of the missing population of young low-mass stars
Silvester	E	Magnetic Doppler Imaging of Ap stars
Simona	M	The Properties of Baryonic Substructures in a Hierarchical Universe: A Deep MegaPrime Survey of the Virgo Cluster
Tholen	M	Follow-up astrometry of Near-Earth objects
Tully	W	Infrared survey of the Virgo Cluster: Large galaxies observed with CFHT
Valls-Gabaud	M	Galaxy Populations in Large Quasar Groups at $0.8<z<1.4$
van Kerkwijk	M	The Virgo Fishing Expedition: Angling for New Types of Transients in the Local Universe
Willott	W	The WIRCam Deep Survey (WIRDS): tracing the evolution of massive galaxies to z~3.

Approved Programs 2008B

E = ESPaDOnS M = MegaPrime W = WIRCam A = AOB

Alecian	E	Magnetic field in young emission line stars, the case of NGC6611 W080.
Beuzit	A	Stellar multiplicity and extrasolar planet formation
Biller	M	A Systematic Survey for Very Young Planetary Mass Ob jects
Bohlender	E	Star-planet interactions: investigating tidal and magnetic effects
Bouvier	W	Isolated Planetary Mass Objects (IPMOs) : nearing the end of the IMF
Brasseur	W	Stellar Population Templates: Constraining Colour-Temperature Relations for JHK_s
Croll	W	Thermal Emission from the hottest of the hot Jupiters
Donati	E	Magnetospheric accretion on classical T~Tauri stars
Doressoundiram	M	Photometry and orbit refinement of transneptunian objects in support of the Herschel space observatory.
Dupuy	W	Dynamical Masses of Brown Dwarfs and Low-Mass Stars
Foucaud	M	Deep U-band imaging of the UKIDSS UDS field
Granett	M	A survey of the Cold Spot
Hoekstra	M	A comprehensive study of dark matter and baryon stripping in galaxy clusters
Hsieh	W	Probing the Dark Age -- A Deep WIRCAM J Survey for z > 7 Galaxies in the Extended Chandra Deep Field-South
Huang	M	Mult i-band follow-up observations of Gamma-Ray Bursts detected by the Swift satellite
Ibata	M &W	How are disks built up? Studing correlations betwen age, metallicity and kinematics in the disk of Andromeda (MegaCam)
Kavelaars	M	Orbital Structure of the High Inclination Components of the Kuiper Belt.
Kervella	M	A 1% precision geometric distance to the prototype Cepheid δ Cep from its light echoes
Kneib	W	WIRCam Deep Survey (WIRDS): Tracing the Evolution of Galaxies to z~3
Kong	M	Joint CFHT/HST/Chandra Observations of the Globular Cluster G1 in M31
Laesker	M & W	Supermassive Black Holes and Host Galaxies: A Fundamental Relation Revisited.
Lin	W	Environment of Galaxy Mergers at z = 1
Ma	W	The mass-assembly history of galaxies in distant MACS clusters
Magnier	M	A Deep u- and J -band Survey of the PS1 Medium Deep Fields B
Martayan	E	Magnetic field in young emission line stars, the case of NGC6611 W080.
McConnachie	M	The physical properties of the proto-galactic building blocks of M31
Montmerle	E	Magnetic fields, X-rays and winds of massive stars: The Rosette cluster
Moraux	M	MONITOR : Young low-mass eclipsing binaries in h and χ Per
Morin	E	Completing the first magnetic survey of M dwarfs
Petit	M	Orbital Structure of the High Inclination Components of the Kuiper Belt.
Petit	E	Magnetic fields, X-rays and winds of massive stars: The Rosette cluster
Petit	M	Probing the Kuiper Belt resonant populations: Neptune's dynamical history
Phan-Bao	E	Mapping the magnetic field topology in partly and fully convective stars:
Reipurth	M	Youg low-mass eclipsing binaries in h and & Per
Rice	E	The T Tauri star V410 Tau - spot evolution and magnetic structure
Sanders	W	Hawaii Imaging/Spectroscopy of the HST-ACS COSMOS 2-deg^2 Treasury Field
Schirmer	M	Mapping the light and mass of the first shear-selected supercluster of galaxies
Shanks	M	Interactions between galaxies and the intergalactic medium at redshift 3.
Soucail	W	Probing the dark matter distribution and the mass-to-light ratio of galaxy groups with the CFHTLS Strong Lensing Legacy Survey (SL2S)
Swift	W	Near Infrared Imaging of Two Galactic Proto-Clusters
Tholen	M	Follow-up Astrometry of Near-Earth Objects
Wade	E	Great balls of fire! Magnetic field properties of single, intermediate-mass giants
Walawender	W	Deep Imaging of Protostellar Outflows
Willott	W	The WIRCam Deep Survey (WIRDS): tracing the evolution of massive galaxies to z~3.
Willott	M	The WMAP Cold Spot - non-Gaussian feature from the early universe or the largest void?

2008 CFHT Refereed Publications

The following criteria are used to judge whether a paper is considered a CFHT publication: "A paper must report new results based on significant observational data obtained at CFHT or be based on archival data retrieved from the CFHT archive. If data from multiple telescopes are included, the CFHT data should represent a significant fraction of the total data." All CFHT refereed publications are located in a dataset on ADS at: http://adsabs.harvard.edu/abstract_service.html

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Glossary

CEA: Commissariat à l'Energie Atomique, the French Agency responsible for the construction of MegaCam, under contract to CFHT.

CFHTLS: The CFHT Legacy Survey takes advantage of MegaCam's large field of view to conduct 3 different surveys totaling over 5000 square degrees in 5 years. The survey will play a crucial role in studies ranging from the nearby KBOs, to brown dwarfs in our Galaxy, to the distribution of matter in the Universe.

MegaCam: A large mosaic of 40 charge-coupled device (CCD) imaging chips that provides a field of view on the sky of one square degree, about five times the area covered by the full moon. It is on the sky since 2003.

MegaPrime: In order to make the best use of MegaCam, a completely new prime-focus environment is needed. The many separate activities involved in this work are grouped under the MegaPrime project. Apart from the original construction, this is the largest development project ever undertaken at CFHT and is the principal activity for much of our technical staff.

WIRCam: Wide-field Infrared Camera. This 16-million pixel camera provides a field of view on the sky somewhat greater than 40% of the area covered by the full moon. It was a major instrumentation project at CFHT and was constructed in collaboration with external partners for deployment on the sky in 2005.

ESPaDOnS: The échelle spectro-polarimeter which gives a complete optical spectrum in a single exposure with a spectral resolution of about 70,000. ESPaDOnS arrived at CFHT in 2004.

HIA: The Herzberg Institute of Astrophysics manages Canada's involvement in major astronomical observatories in Chile and Hawaii, and participated in the MegaPrime project.

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