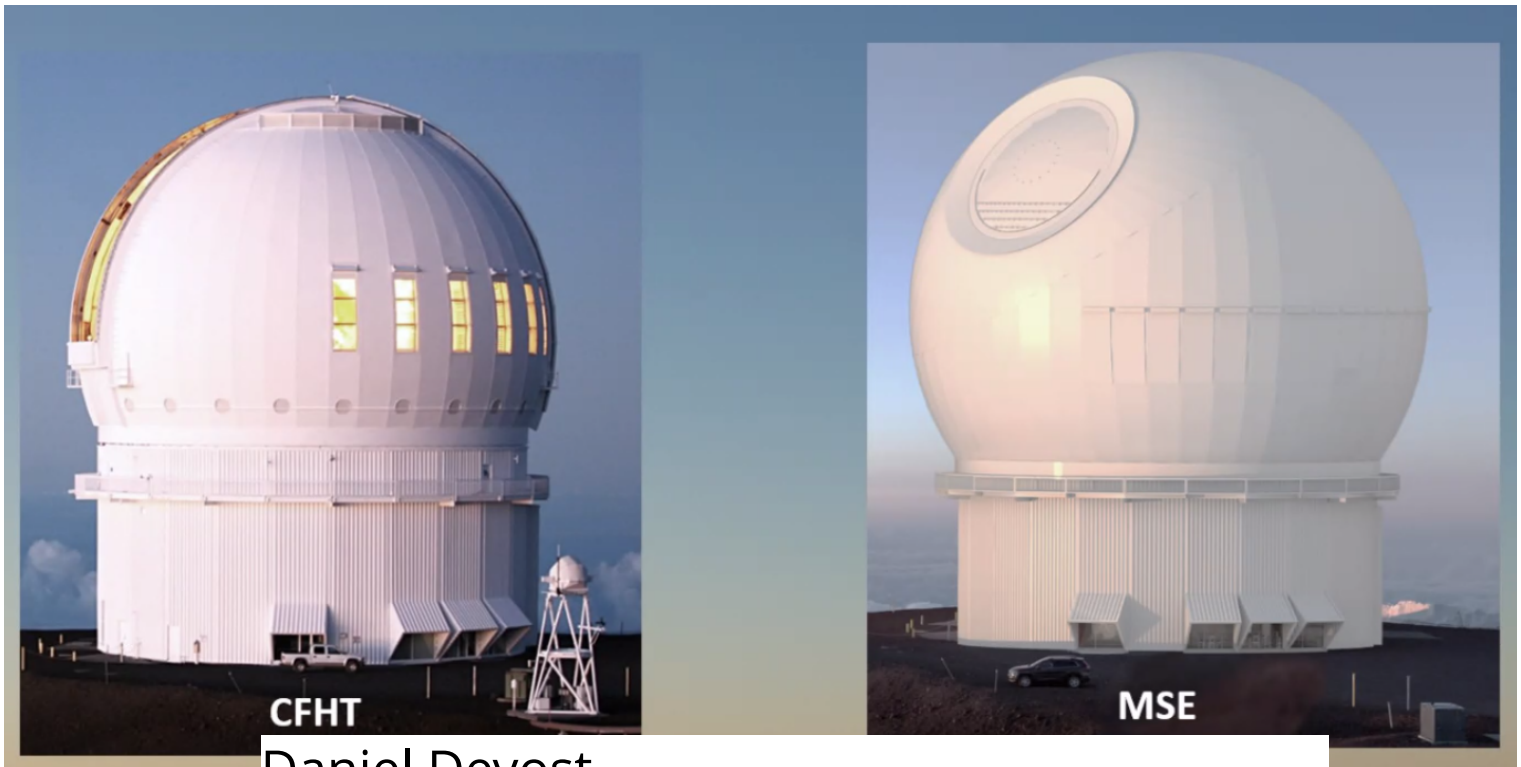
CFHT/MSE status update



Daniel Devost

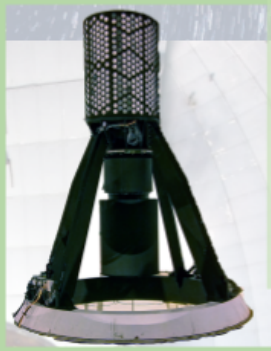
Director of Science Operations

FY2021 Subaru Users Meeting

CFHT status update

Current instrumentation

WIRCam
20'x20' NIR imager
128 Mpix @ 0.306 pix/"
Filter set:
BB: Y, J, W, H, Ks
NB: Low OH, CH4 (On & Off),
H2 (v=1-0 S(1)),Kcont,Brγ,CO

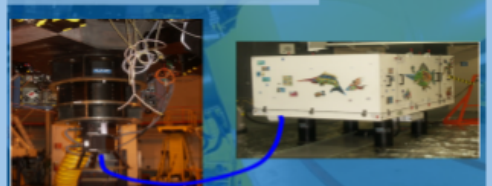


MegaCam
- 1° x 1° optical imager
- 360 Mpix @ 0.189 pix/"
Filter set:
- BB u, g, r, i, z gri.
- NB Ha on-off, OIII on-off and CaH&K.

Prime Focus Instruments

Cassegrain Focus Instruments

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



SPIRou
High resolution NIR spectropolarimeter and velocimeter (1 m/s goal) for the detection and of Exoplanets.

Started normal operations in Feb 2019.

SITELLE
11'x11' IFTS
R = 2 – 9600 (tested)
15000 Instrumental
350nm to 800 nm

Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

- Main engineering activities
- Science highlights

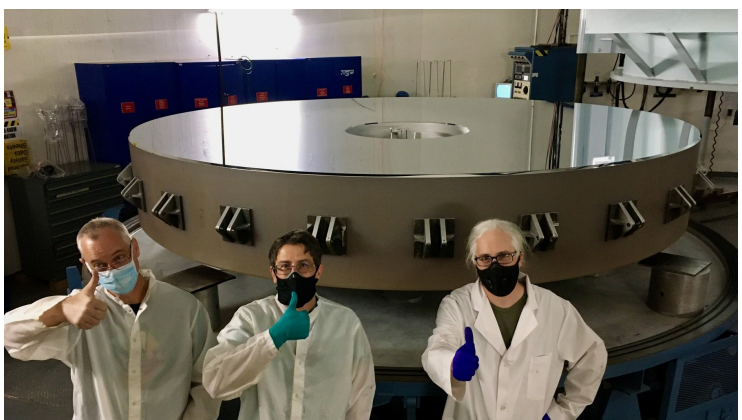
Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

New PH2 system.
Primary mirror maintenance
Telescope Hydraulics

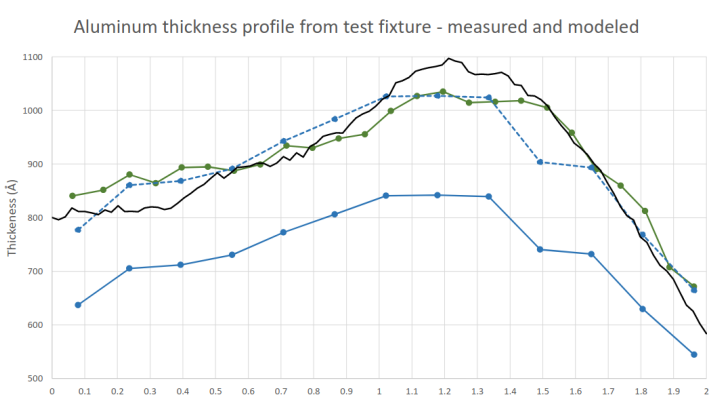
- Main engineering activities

October 2020 shutdown



2010/2020 Results and comparison to model

Heavy modification of the coating chamber along with a model of the aluminium dispersion inside the chamber gave us the best coating produced at CFHT since 2007.



Coating Year	Average edge thickness (Å)	Center thickness (Å)
2007	660 ± 30	1094 ± 15*
2011	580 ± 35	795 ± 30
2014	780 ± 40	810 ± 30
2017	670 ± 40	850 ± 45
2020	960 ± 40	1080 ± 30

CFHT status update

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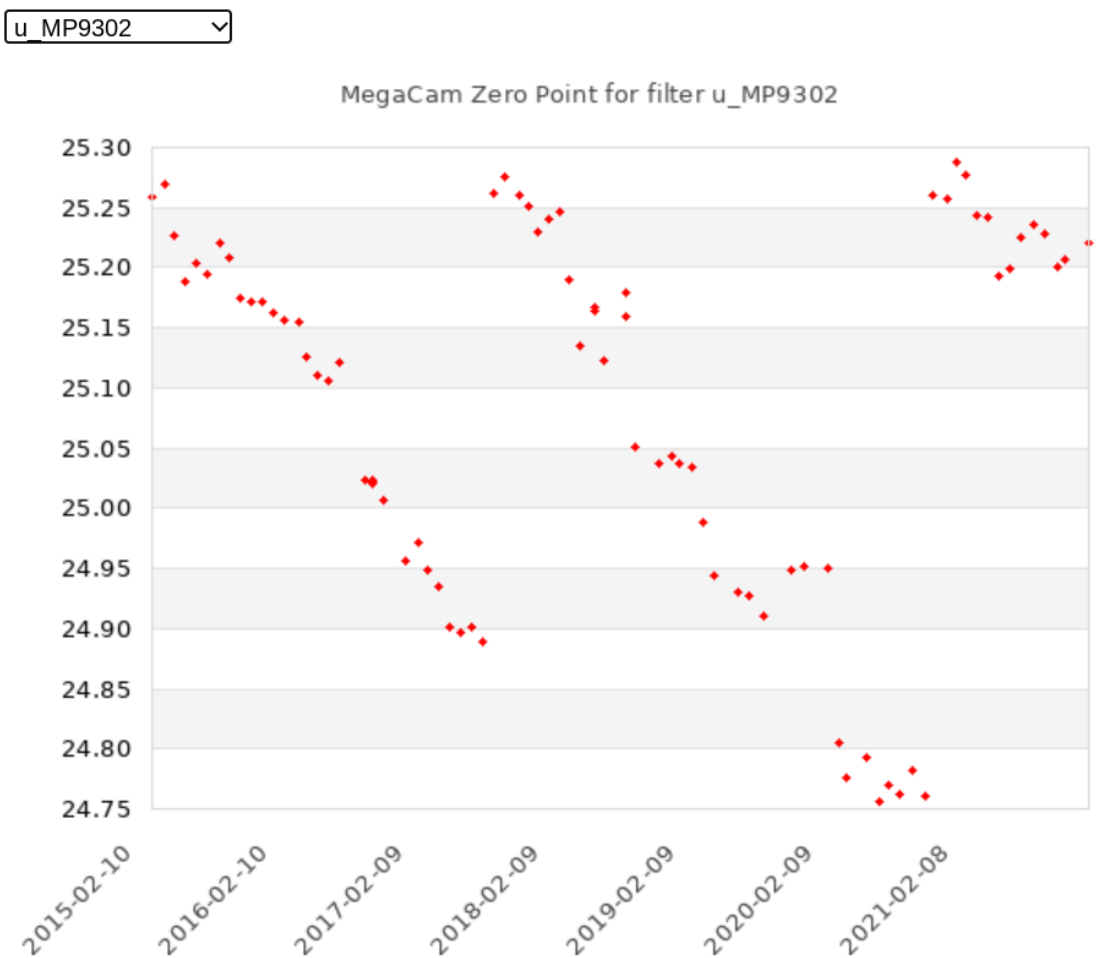
Primary mirror maintenance



The mirror reflectivity has been degrading faster during the last few years. The cause is unclear.

CFHT status update

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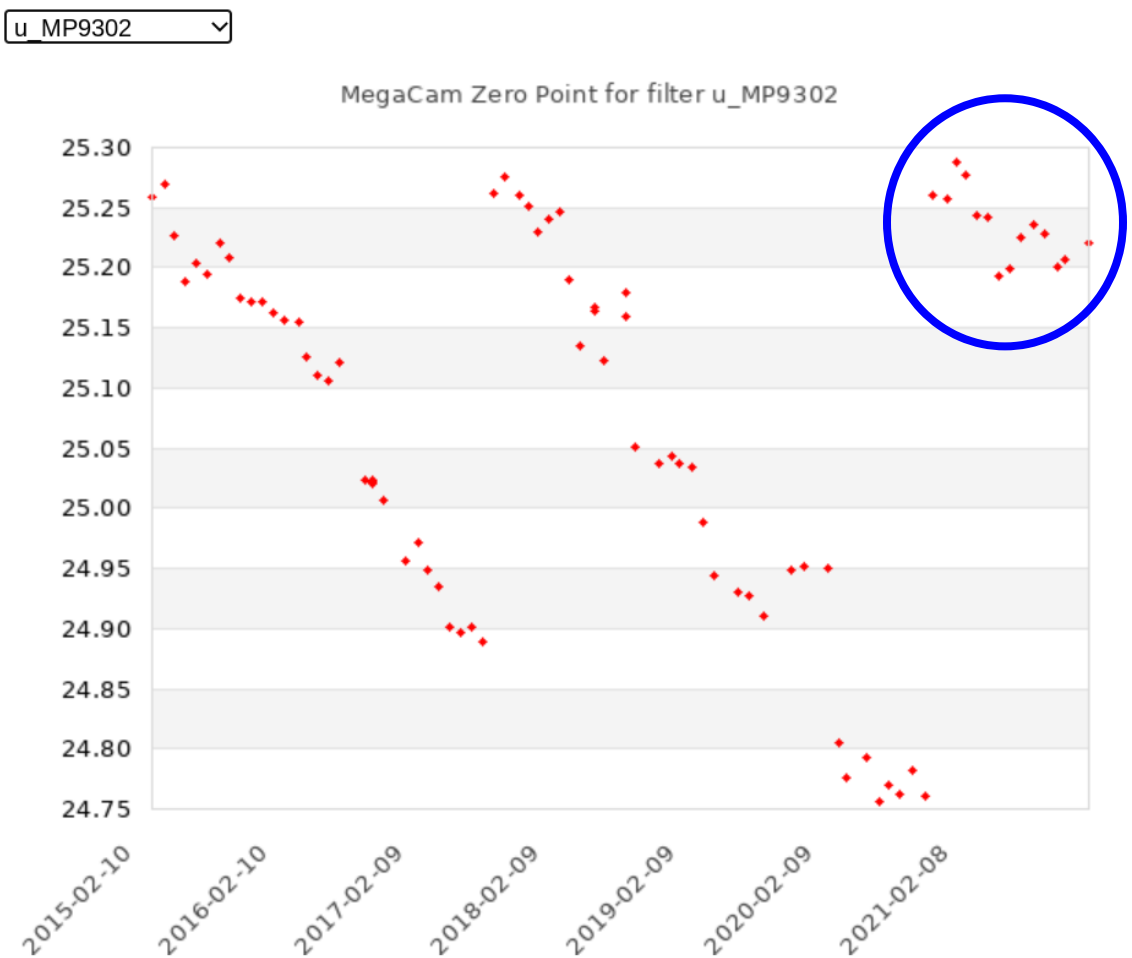
Primary mirror maintenance



A condensation monitoring system as well as a dry air condensation prevention system have been installed. Too early to say if this system has any effect.

CFHT status update

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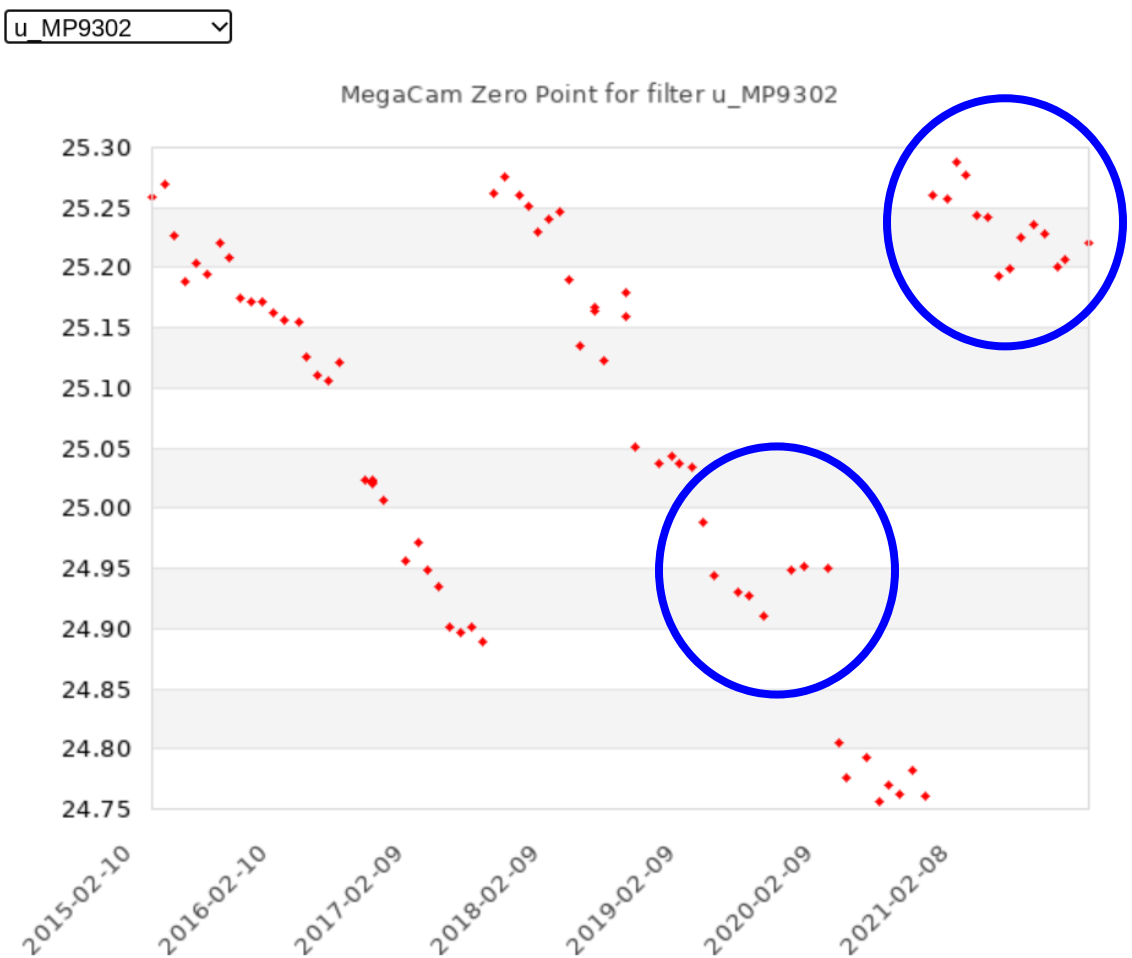
- Main engineering activities
  Primary mirror maintenance



We are also exploring periodically cleaning the mirror using "First Contact" a product that gets applied and peeled from the mirror. Preliminary results obtained in February 2020 are encouraging.

CFHT status update

October 2020 shutdown
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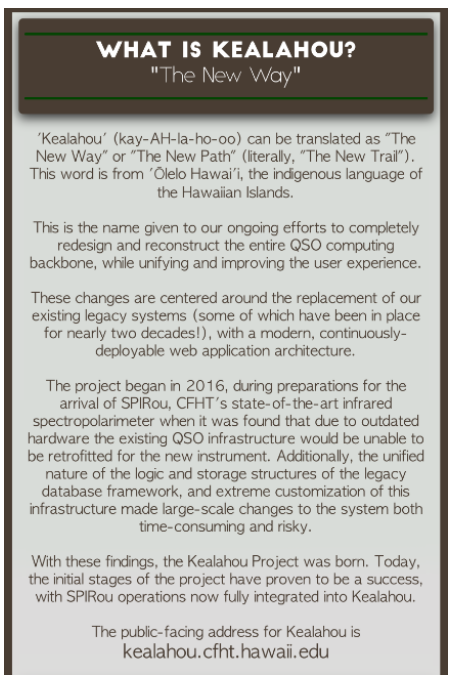


WHAT IS KEALAHOU?
"The New Way"

'Kealahou' (kay-AH-la-ho-oo) can be translated as "The New Way" or "The New Path" (literally, "The New Trail"). This word is from 'Ōlelo Hawai'i, the indigenous language of the Hawaiian Islands.

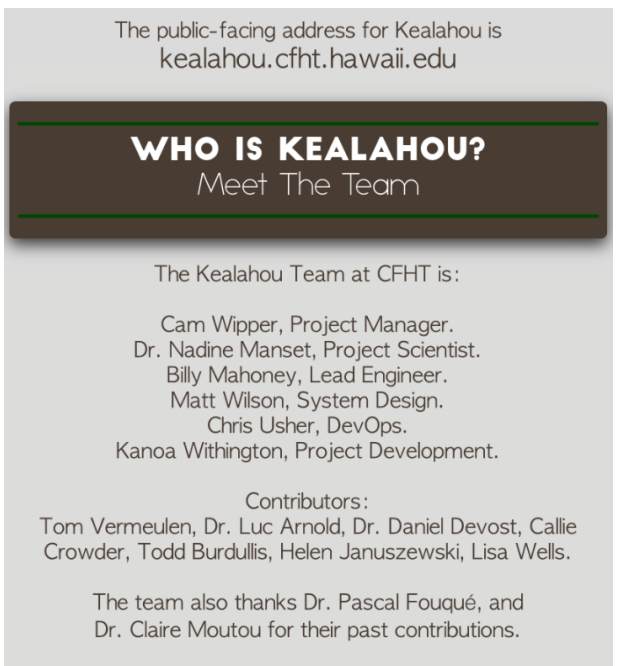
This is the name given to our ongoing efforts to completely redesign and reconstruct the entire QSO computing backbone, while unifying and improving the user experience.

These changes are centered around the replacement of our existing legacy systems (some of which have been in place for nearly two decades!), with a modern, continuously-deployable web application architecture.

The project began in 2016, during preparations for the arrival of SPIRou, CFHT's state-of-the-art infrared spectropolarimeter when it was found that due to outdated hardware the existing QSO infrastructure would be unable to be retrofitted for the new instrument. Additionally, the unified nature of the logic and storage structures of the legacy database framework, and extreme customization of this infrastructure made large-scale changes to the system both time-consuming and risky.

With these findings, the Kealahou Project was born. Today, the initial stages of the project have proven to be a success, with SPIRou operations now fully integrated into Kealahou.

The public-facing address for Kealahou is
kealahou.cfht.hawaii.edu



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WHO IS KEALAHOU?
Meet The Team

The Kealahou Team at CFHT is:

Cam Wipper, Project Manager.
Dr. Nadine Manset, Project Scientist.
Billy Mahoney, Lead Engineer.
Matt Wilson, System Design.
Chris Usher, DevOps.
Kanoa Withington, Project Development.

Contributors:
Tom Vermeulen, Dr. Luc Arnold, Dr. Daniel Devost, Callie Crowder, Todd Burdullis, Helen Januszewski, Lisa Wells.

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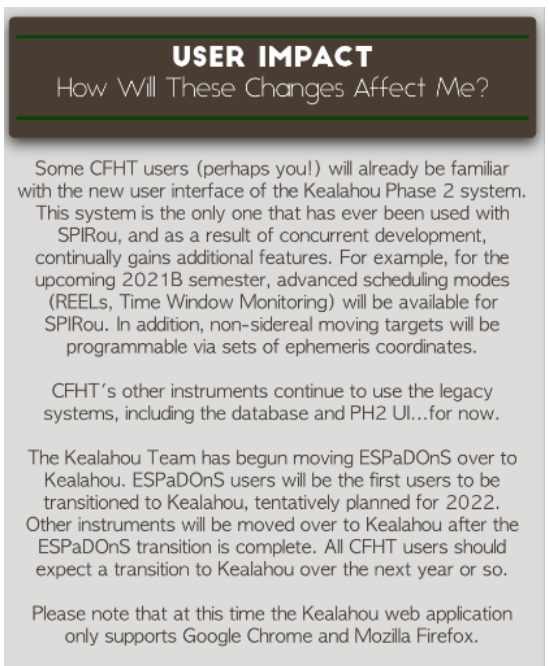

USER IMPACT
How Will These Changes Affect Me?

Some CFHT users (perhaps you!) will already be familiar with the new user interface of the Kealahou Phase 2 system. This system is the only one that has ever been used with SPIRou, and as a result of concurrent development, continually gains additional features. For example, for the upcoming 2021B semester, advanced scheduling modes (REELs, Time Window Monitoring) will be available for SPIRou. In addition, non-sidereal moving targets will be programmable via sets of ephemeris coordinates.

CFHT's other instruments continue to use the legacy systems, including the database and PH2 UI...for now.

The Kealahou Team has begun moving ESPaDOnS over to Kealahou. ESPaDOnS users will be the first users to be transitioned to Kealahou, tentatively planned for 2022. Other instruments will be moved over to Kealahou after the ESPaDOnS transition is complete. All CFHT users should expect a transition to Kealahou over the next year or so.

Please note that at this time the Kealahou web application only supports Google Chrome and Mozilla Firefox.

Daniel Devost
Canadian Resident Astronomer, SUM 2021

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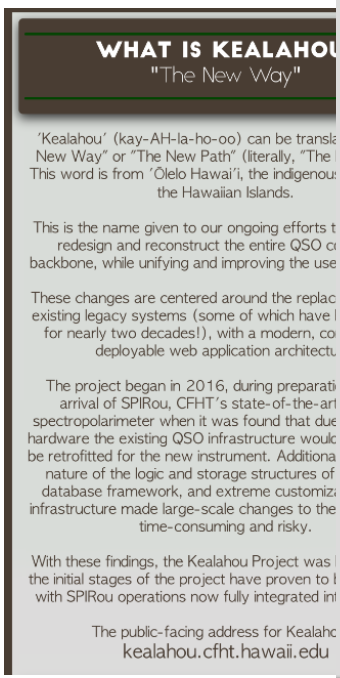

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Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

- Main engineering activities

  Telescope Hydraulics

Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

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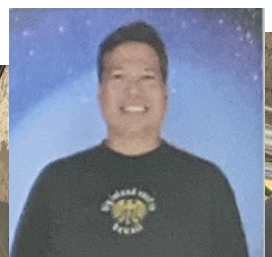
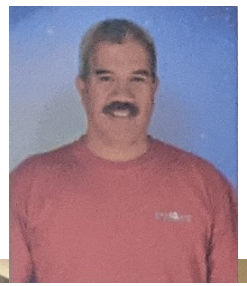
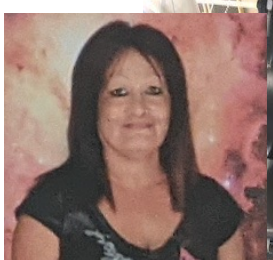
  - Telescope Hydraulics


Steve Hughes


Casey Elisares


Ivan Look


Raycen Wong


Ilima Isabel


Seizen Tsuha


Tyson Arruda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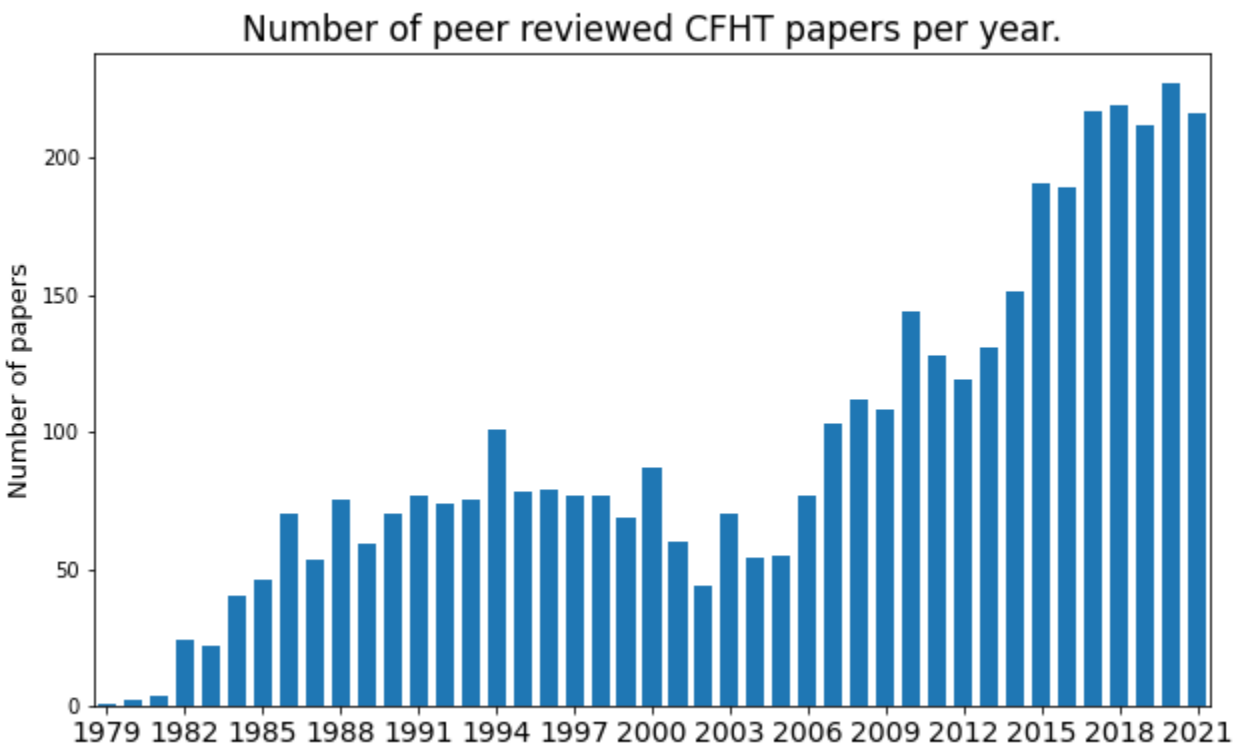
Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

- Science highlights

CFHT is at an all time peak productivity thanks to an efficient QSO system and streamlined data processing and a very active users community.

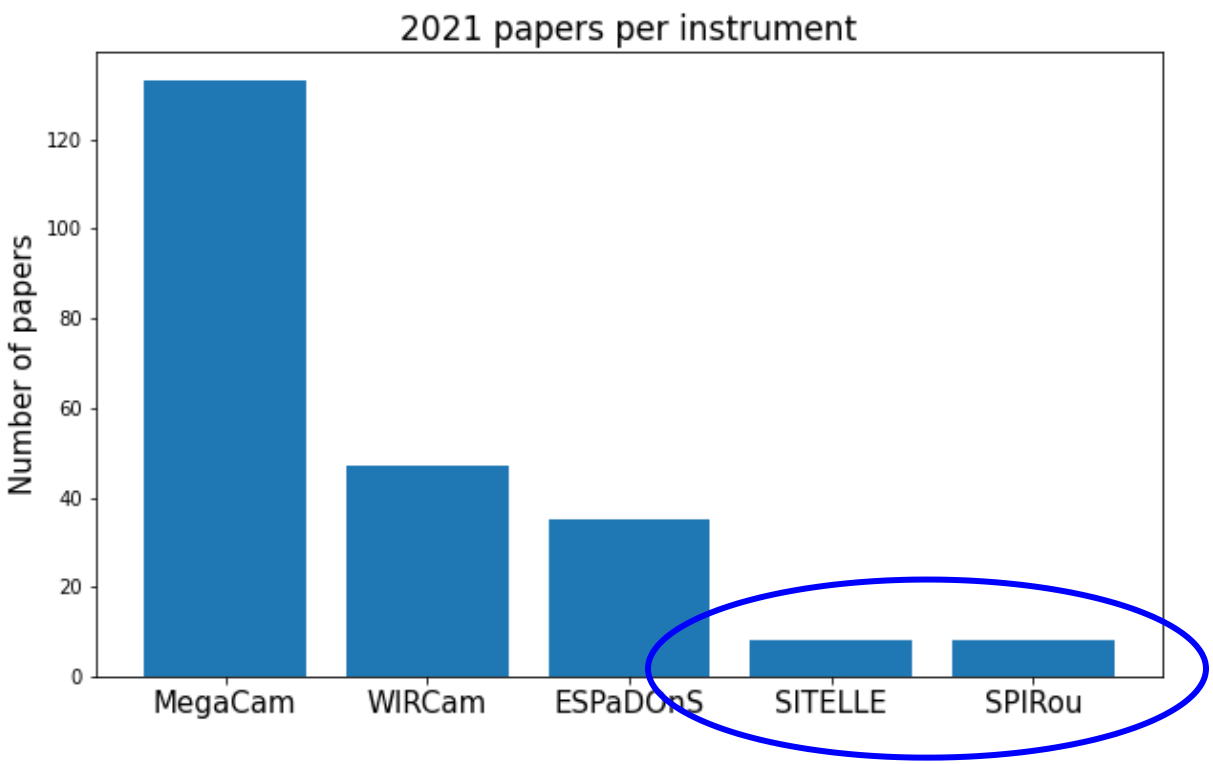


Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

- Science highlights

SITELLE and SPIRou are starting to be scientifically productive



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Canadian Resident Astronomer, SUM 2021

CFHT status update

- Science highlights

The Canada-France Imaging Survey (CFIS)

PIs: Dr. Jean-Charles Cuillandre (F) and Dr. Alan McConnachie (C)

Instrument: MegaPrime. CFIS was extended to 2022A.

VESTIGE: A Virgo Environ… …racing Ionised Gas Emission

Completed

PI: Alessan

Instrument: M… …ime. VESTIGE was extended to 2021A

The SPIRou Legacy Survey (SLS)

PI: Dr. Jean-François Donati

Instrument: SPIRou, 300 nights allocated.

The Star formation, Ionized Gas, and Nebular Abundances Legacy Survey (SIGNALS)

PI: Laurie Rousseau-Nepton

Instrument: SITELLE, 54.7 nights allocated.

The SAC and the Board are looking into extending some of the current Large Programs and considering a new Call for LPs that would likely start in 2022B. Stay tuned.

CFHT status update

- 2021 Science highlights

January 05 2022

An Uniquely Pristine Cluster Remnant

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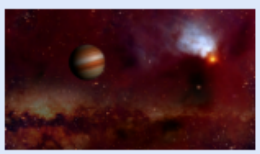
Largest Collection of Rogue Planets Discovered in our Milky Way



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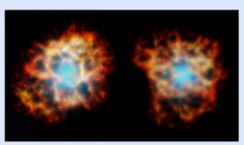

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SPIRou Stares at a Young Rebel: AU Mic Planetary System

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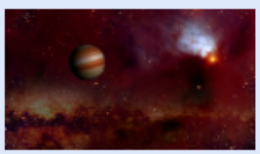

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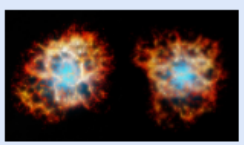

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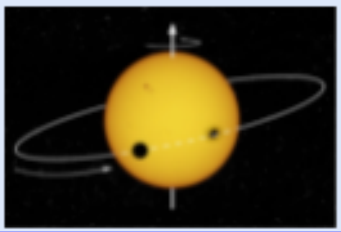


AU Mic b: 17.1 M_{Earth}, 1.3 g cm-3

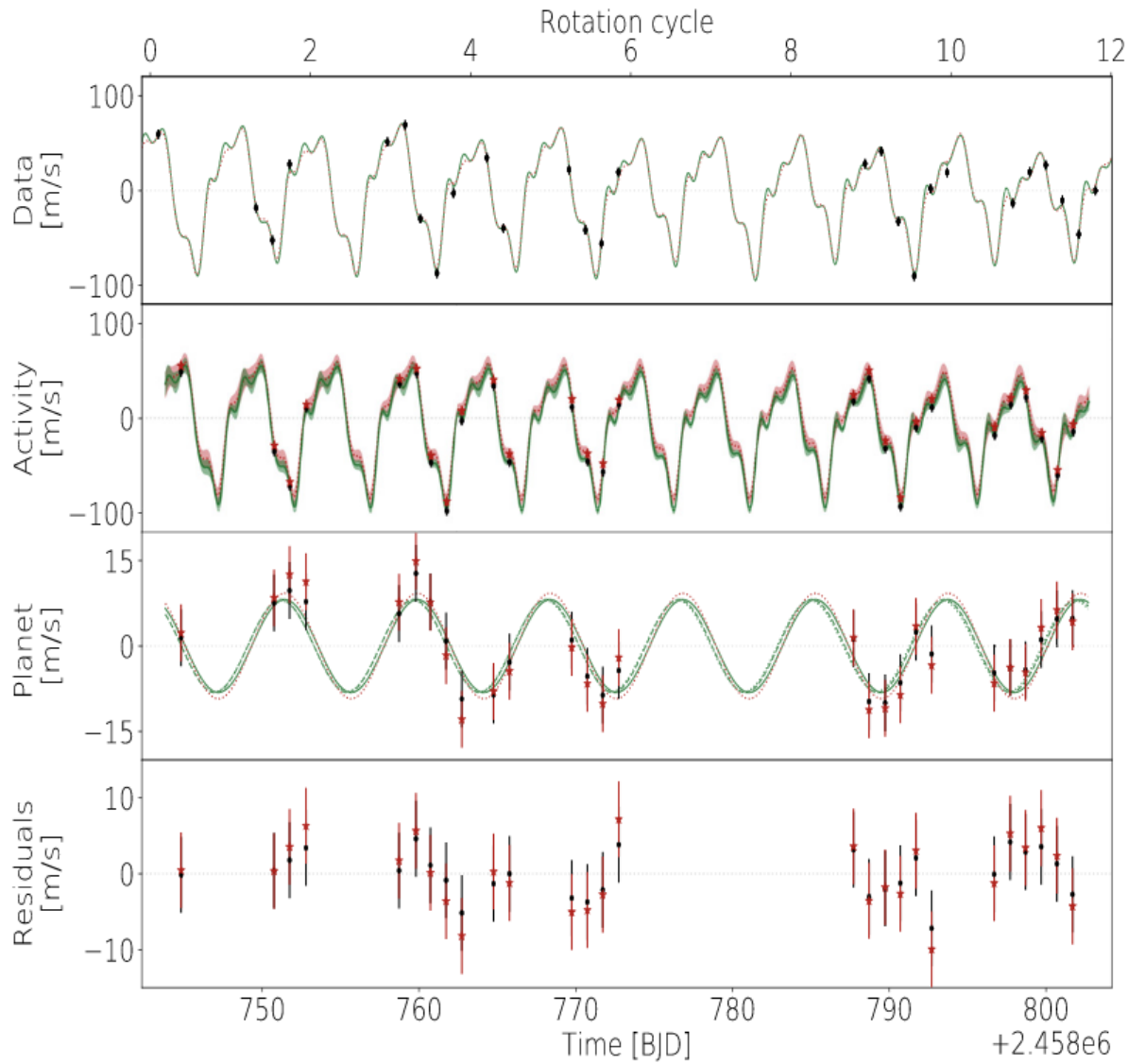
Investigating the young AU Mic system with SPIRou: large-scale stellar magnetic field and close-in planet mass

Baptiste Klein,[1★] Jean-François Donati,[1] Claire Moutou,[1] Xavier Delfosse,[2] Xavier Bonfils,[2] Eder Martioli,[3,4] Pascal Fouqué,[1,5] Ryan Cloutier,[6] Étienne Artigau,[7] René Doyon,[7] Guillaume Hébrard,[3] Julien Morin,[8] Julien Rameau,[2] Peter Plavchan[9] and Eric Gaidos[10★]

[1] *Université de Toulouse, CNRS, IRAP, 14 av. Belin, F-31400 Toulouse, France*
[2] *CNRS, IPAG, Université Grenoble Alpes, F-38000 Grenoble, France*
[3] *Institut dAstrophysique de Paris, UMR7095 CNRS, Université Pierre and Marie Curie, 98bis boulevard Arago, F-75014 Paris, France*
[4] *Laboratorio Nacional de Astrofisica (LNA/MCTI), Rua Estados Unidos, 154, Itajuba, MG, Brazil*
[5] *CFHT Corporation, 65-1238 Mamalahoa Hwy, Kamuela, HI 96743, USA*
[6] *Center for Astrophysics | Harvard and Smithsonian, 60 Garden Street, Cambridge, MA 02138, USA*
[7] *Institut de Recherche sur les Exoplanètes (IREx), Département de Physique, Université de Montréal, C.P. 6128, Succ. Centre-Ville, Montréal, QC H3C 3J7, Canada*
[8] *LUPM, Université de Montpellier, CNRS, Place Eugène Bataillon, F-34095 Montpellier, France*
[9] *Department of Physics and Astronomy, George Mason University, Fairfax, VA 22030, USA*
[10] *Department of Earth Sciences, University of Hawai'i at Manoa, Honoluu, HI 96822, USA*

CFHT status update

- AU Mic b:



Rebel: AU

Investigating
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stellar

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ils,[2]

[1] *Université de Toulouse,*
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[3] *Institut dAstrophysique d*
[4] *Laboratorio Nacional de*
[5] *CFHT Corporation, 65-*
[6] *Center for Astrophysics |*
[7] *Institut de Recherche sur*
Canada
[8] *LUPM, Université de Mo*
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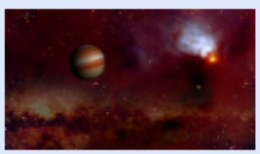

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Maunakea Spectroscopic Explorer and Astro2020

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White Dwarfs Become Magnetic As They Get Older

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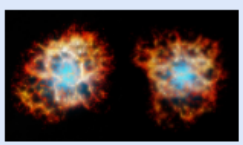

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SPIRou Stares at a Young Rebel: AU Mic Planetary System

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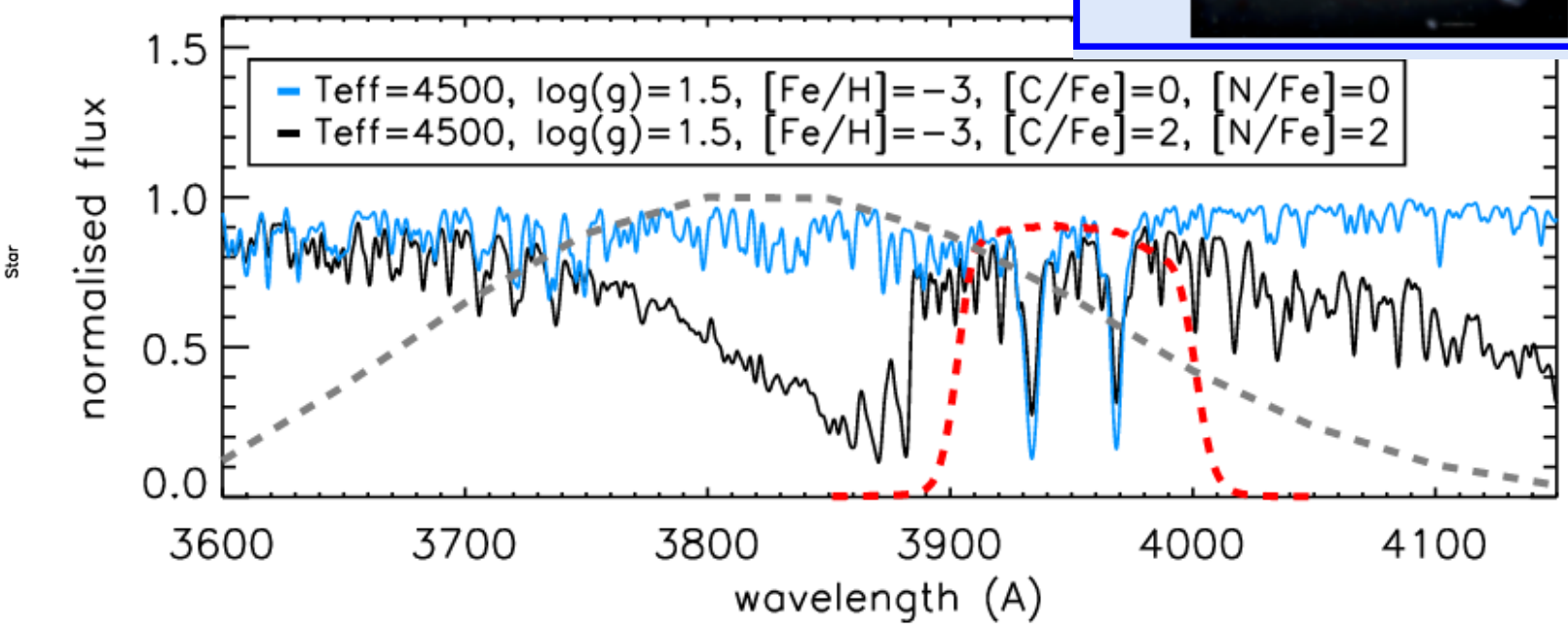
CFHT status update

- 2021 Science highlights

  The Pristine Survey

January 05 2022

An Uniquely Pristine Cluster Remnant



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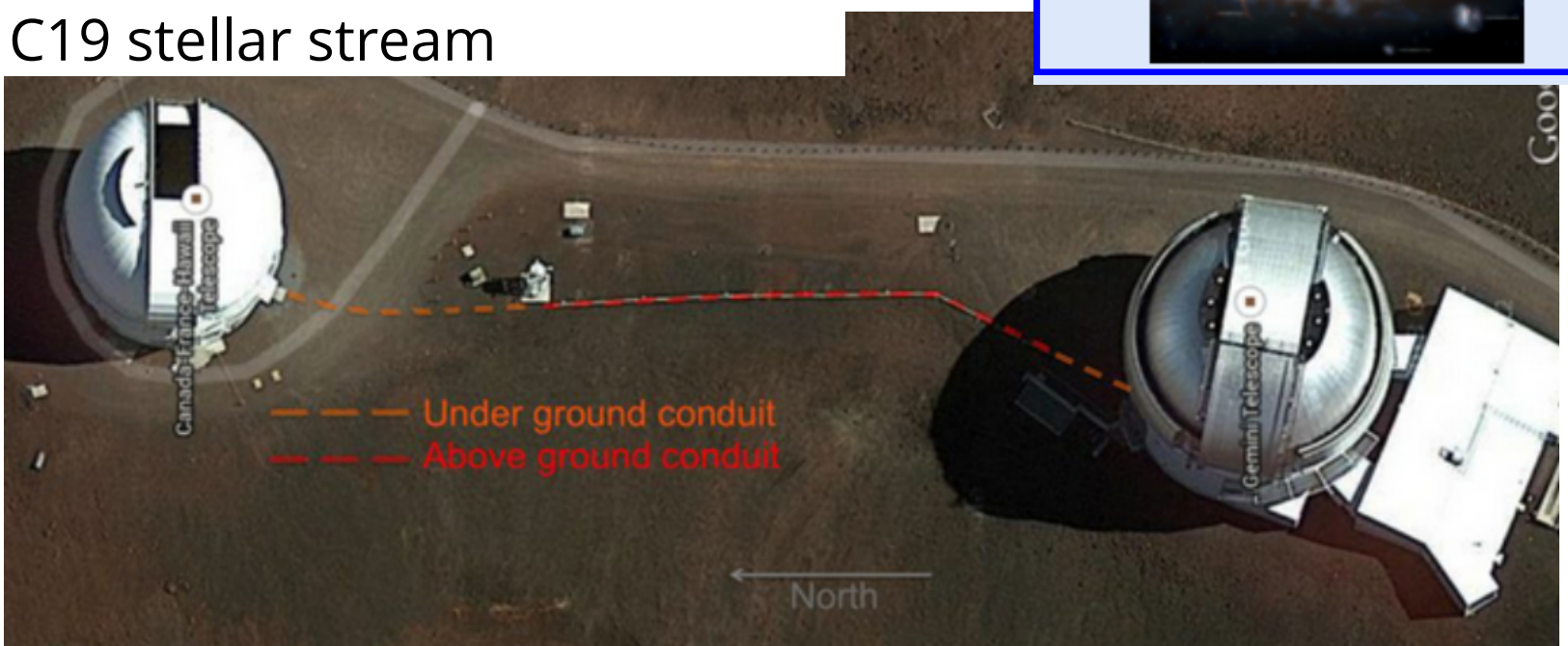
Canadian Resident Astronomer, SUM 2021

CFHT status update

- 2021 Science highlights

  The Pristine Survey

They used GRACES to follow-up on the C19 stellar stream



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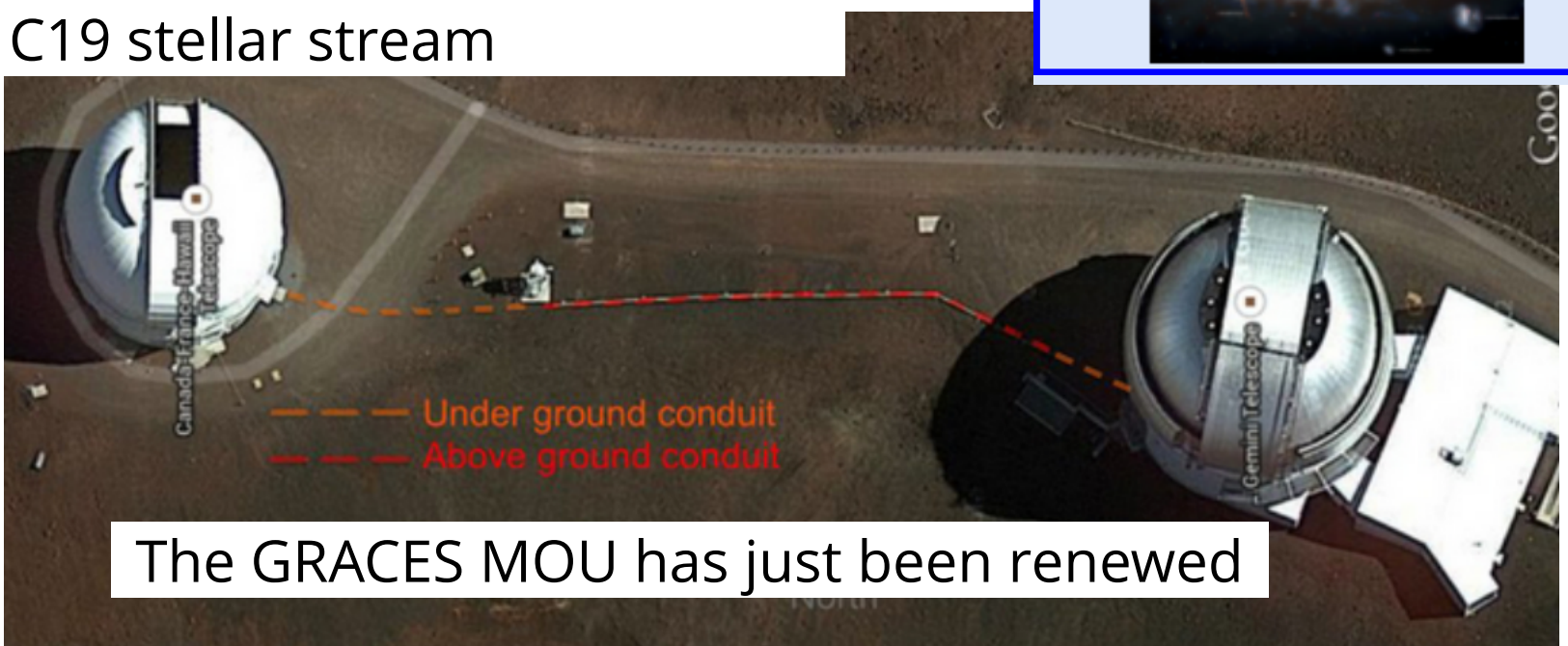

The GRACES MOU has just been renewed

Daniel Devost
Canadian Resident Astronomer, SUM 2021

CFHT status update

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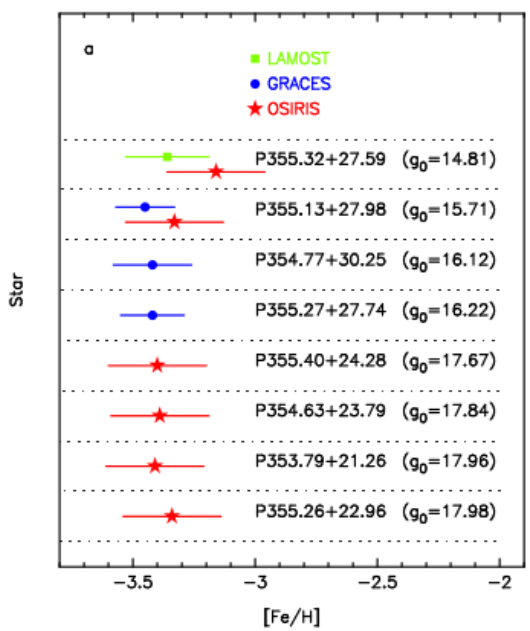
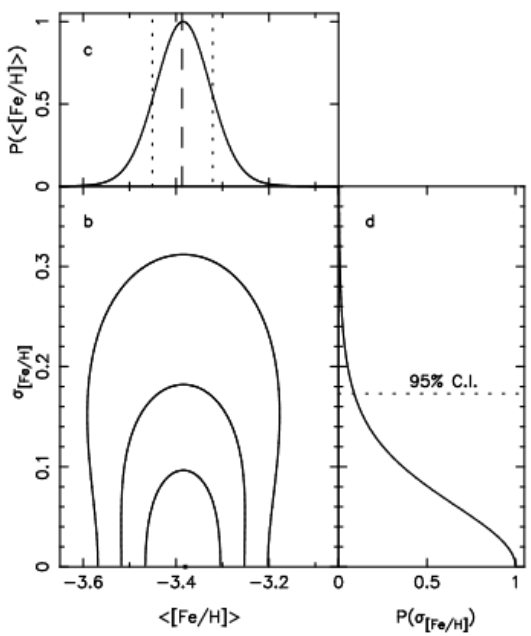
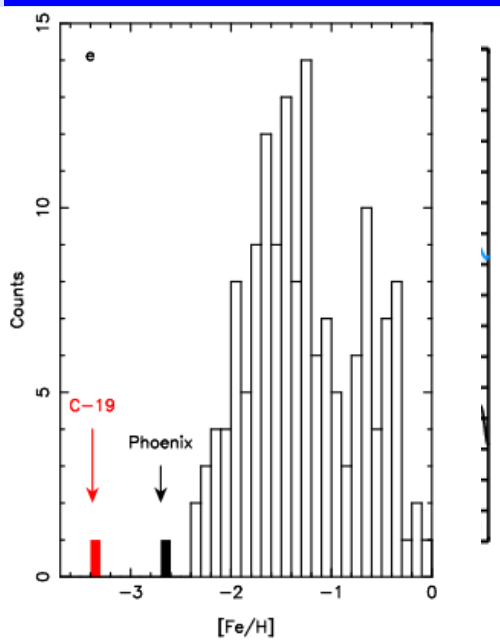
[Fe/H] = -3.38 +/- 0.06 (stat) +/- 0.2 (syst)

January 05 2022

An Uniquely Pristine Cluster Remnant

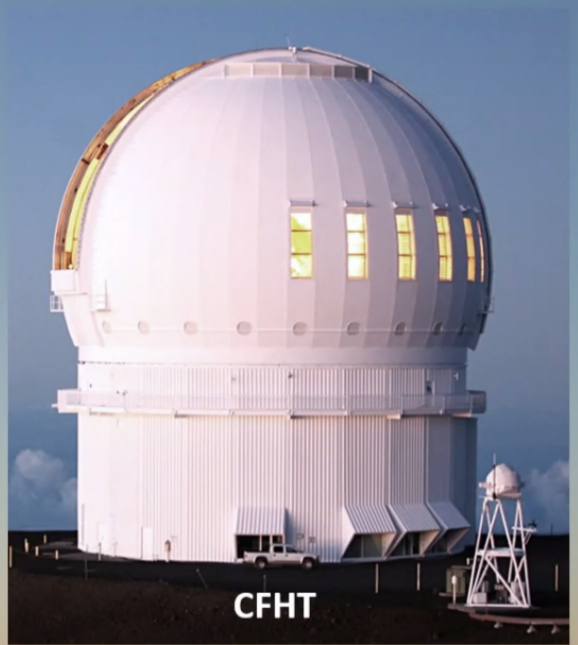






Daniel Devost
Canadian Resident Astronomer, SUM 2021

MSE Status update

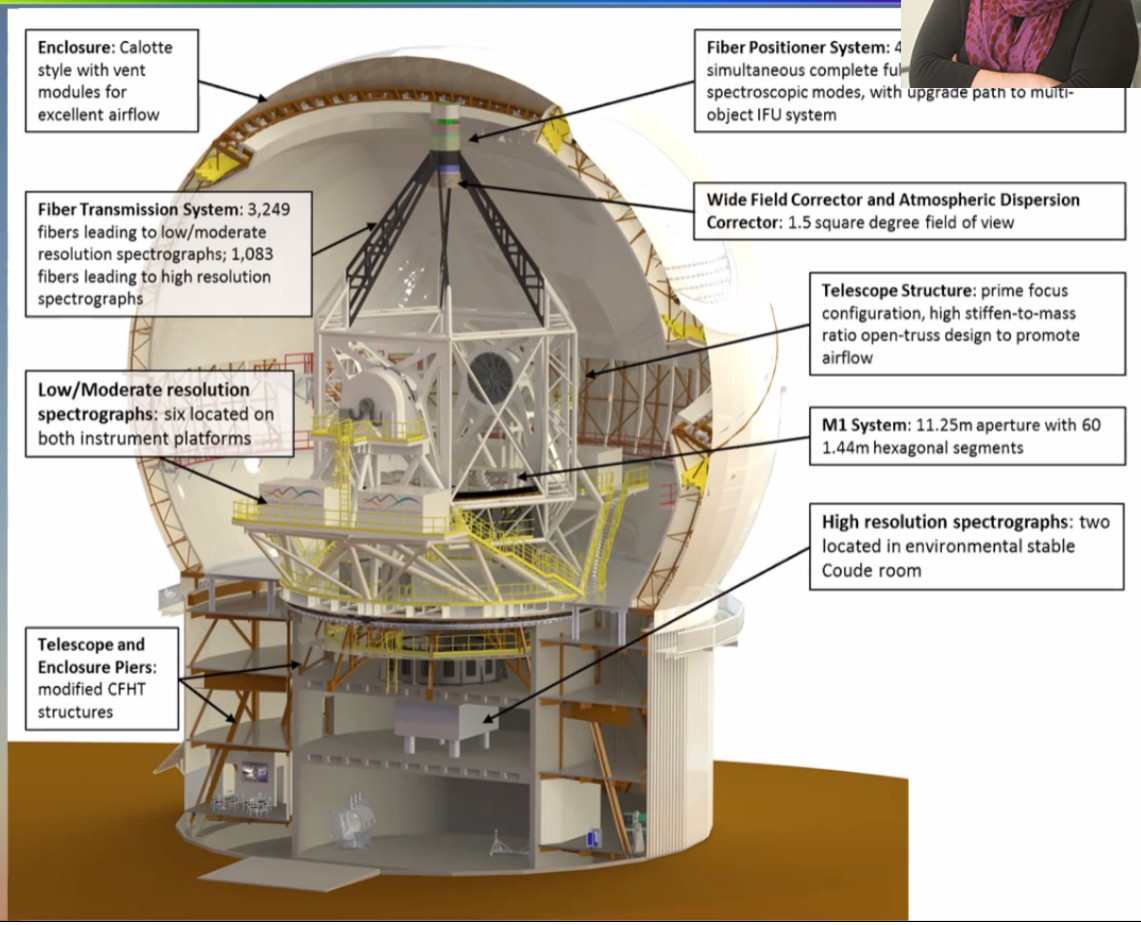


Maunakea Spectroscopic Explorer

MSE Conceptual Design 20

- 11.25m diameter telescope
- 1.5 square degree field of view
- 4,332 fiber positioner feeds two sets of spectrographs
  - Low/moderate resolution:
    - R=λ/Δλ~3,000 or R~6,000
    - UV to H band
    - 3249 fibers
  - High resolution:
    - R~40,000
    - 3 optical wavelength windows
    - 1083 fibers

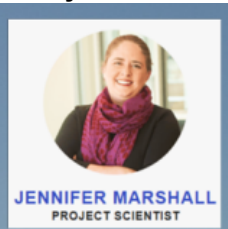
Completely dedicated survey facility



Project Office Members

Maunakea Spectroscopic Explorer

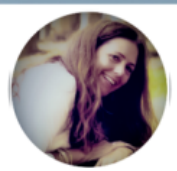
Jennifer Marshall will be leaving the Project Scientist position



JENNIFER MARSHALL
PROJECT SCIENTIST

ANDREEA PETRIC
DEPUTY PROJECT SCIENTIST

JENNIFER SOBECK
SYSTEM SCIENTIST

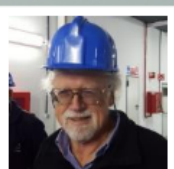


LAURIE DALE
OFFICE ADMINISTRATOR

MARY BETH LAYCHAK
EDUCATION AND PUBLIC OUTREACH LEAD

BARBARA SMALL
PROJECT ADMINISTRATOR

LISA WELLS
SHAREPOINT ADMINISTRATOR



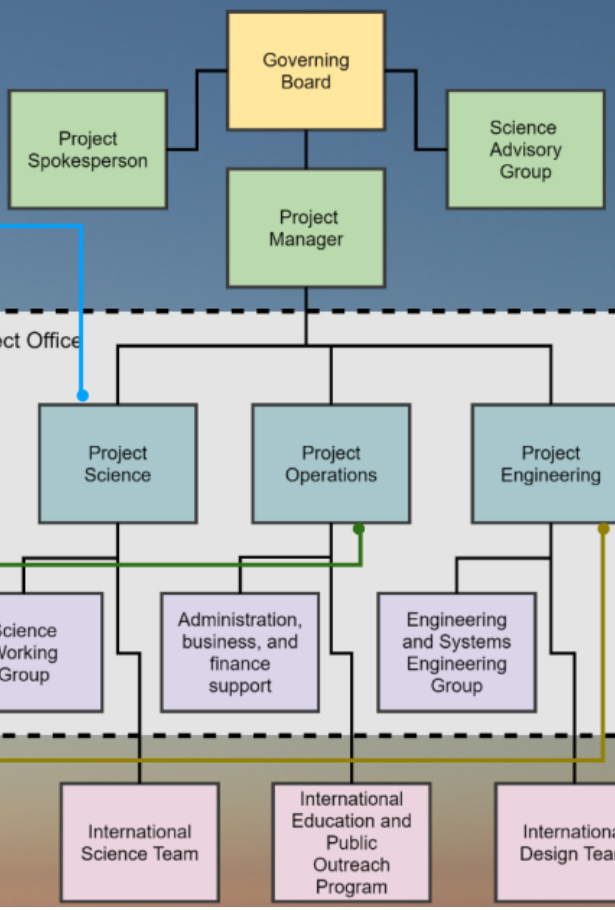
DERRICK SALMON
WISDOM PROVIDER

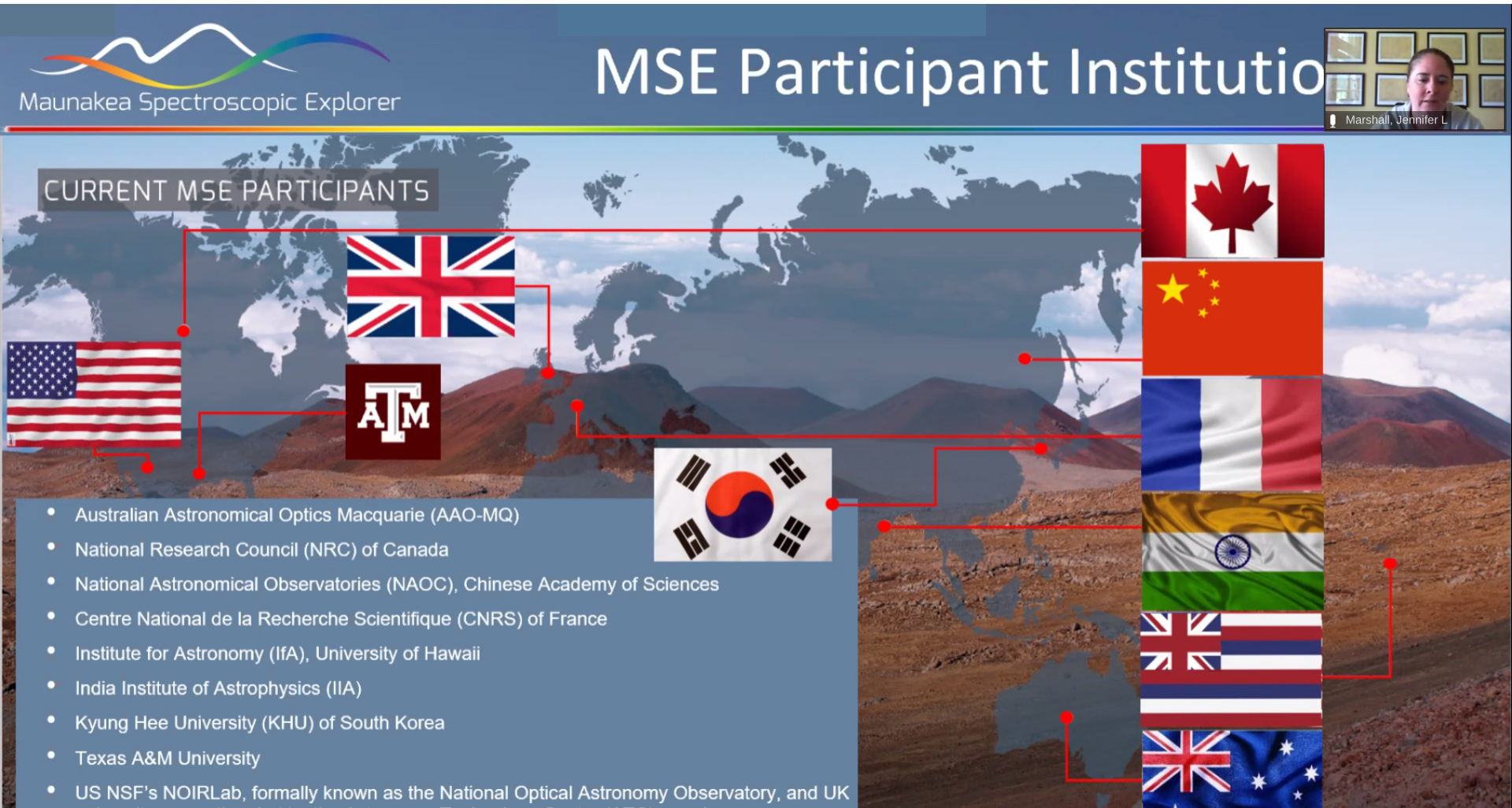
RICK MUROWINSKI
PROJECT ADVISOR

SAM BARDEN
SYSTEMS ENGINEER

ALEXIS HILL
DEPUTY PROJECT ENGINEER

CHRISTIAN SURACE
PESA TECHNICAL LEAD





Maunakea Spectroscopic Explorer

Timeline to Science Operatic

Science Commissioning will begin in 2030

- Based on a technically paced schedule with no constraints on resources and cash flow

The project timeline is organized in four major overlapping phases with three milestones:

- Preliminary Design Phase - 2 yrs
- Construction Phase - 6.5 yrs duration
- System-Level Assembly, Integration and Verification (AIV) Phase - 5.5 yrs
- Science Commissioning - 2 yrs

MSE and Astro 2020

MSE's strengths encompass two of three of Astro2020's priorities for mid-sized projects: time domain astronomy and highly multiplexed optical spectroscopy. The MSE detailed science case outlines the compelling science that MSE will execute, much of which falls within the three main science themes identified by Astro2020: "Worlds and Suns in Context" (exoplanets), "New Messengers and New Physics" (transient astrophysics), and "Cosmic Ecosystems" (the evolution of galaxies).

The MSE collaboration is thrilled to see the development of a multiplexed optical spectroscopic facility identified as a strategic priority. The CFHT board is committed to the Maunakea Spectroscopic Explorer as the future of the facility. The Board is confident that, following deeply rooted CFHT practices, the MSE project will be respectful of our privilege to share the cosmos from Maunakea, and will continue CFHT's long-standing history of engaging the Hawai'i Island community.

2022 Users meeting

Canada-France-Hawaii Telescope
13th Users' Meeting

Building the Future from a Strong Foundation.

May 9 - 11 2022.

At over 40 years old, CFHT continues a healthy balance of PI-led programs and large programs that take advantage of its instrumentation suite. CFHT offers 5 modern instruments collectively capable of imaging, spectroscopy, and spectropolarimetry that enable science from exoplanets and stellar activity to small solar system bodies, star formation, and cosmology. The diversity of instruments, combined with efficient queue operations and a focus on Large Programs, keeps CFHT among the most scientifically productive observatories in the world. Through upgraded instrumentation and operations CFHT has reinvented itself many times and its most significant iteration is now on the horizon.

The vision for the future of CFHT is the Maunakea Spectroscopic Explorer (MSE). MSE will lead the world in multi-object spectroscopy with dedicated survey operations. MSE science is diverse and ranges from exoplanets to stellar populations in nearby galaxies to the composition and dynamics of the distant universe. Now is a critical time for defining the future of CFHT taking advantage of its unique instrumentation and exceptional site, as we prepare for a new era with MSE.

At this, the 13th Users' Meeting in CFHT's history, we as a community we will discuss exciting recent scientific results and plans for the next ones. Most importantly, we will help guide the future direction of CFHT.

Laura Parker, Chair, CFHT Scientific Advisory Council
Chair, UM2022 Scientific Organizing Committee.

Daniel Devost, Director of Science Operations.
Co-Chair, UM2022 Scientific Organizing Committee.

Local Organizing Committee (LOC)

Daniel Devost, Chair (CFHT, Hawaii)
Laura Parker, SOC chair (McMaster University, Canada)
Patti Freeman (CFHT, Hawaii)
Nicolas Martin (Observatoire Astronomique de Strasbourg, France)
Pierre-Alain Duc (Observatoire Astronomique de Strasbourg, France)
Laurie Rousseau-Nepton (CFHT, Hawaii)
Luc Arnold (CFHT, Hawaii)
Ferdinand Babas (CFHT, Hawaii)
Mary Beth Laychak (CFHT, Hawaii)
Veronique Trimbour (Observatoire Astronomique de Strasbourg, France)
Sandrine Langenbacher (Observatoire Astronomique de Strasbourg, France)
LOC contact:

um2022loc@cfht.hawaii.edu

CFHT/MSE status update