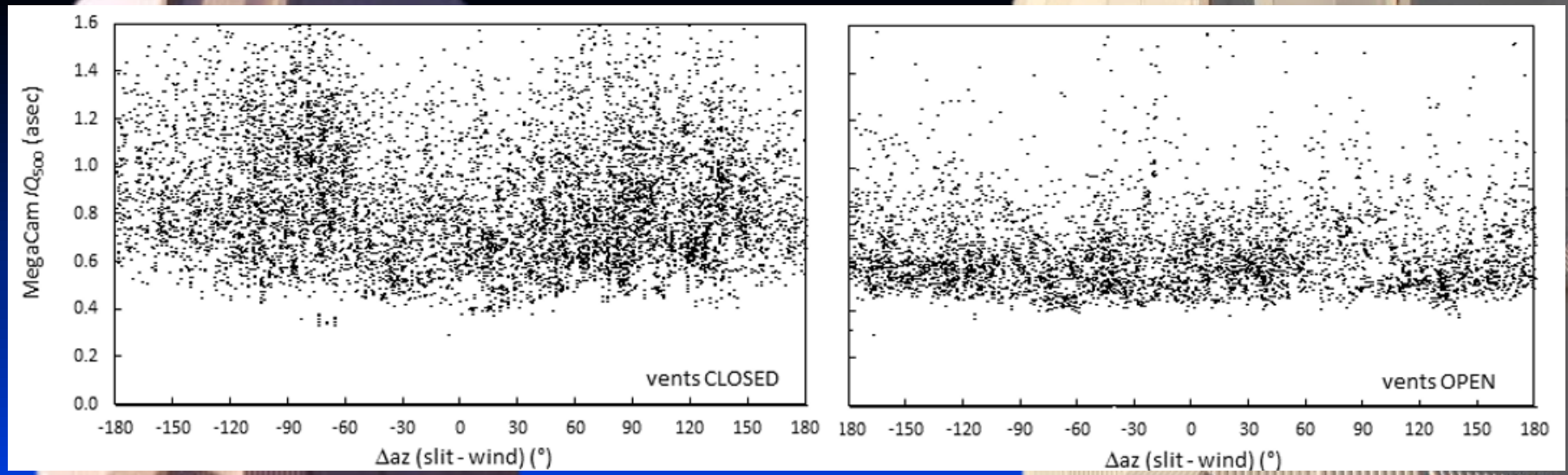
CFHT Focused on the Future

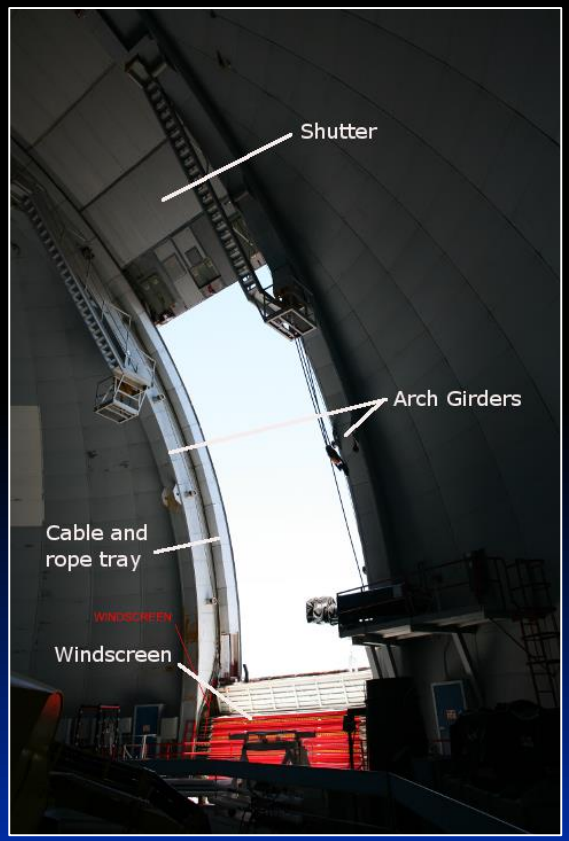
CFHT Users' Meeting

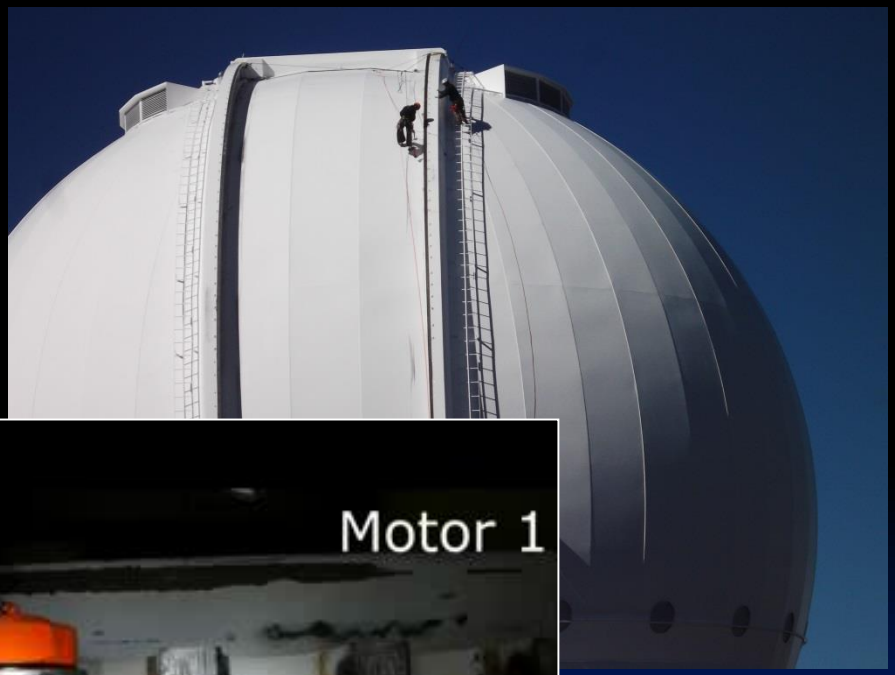
May 2016

2013 CFHT 2016



2013 CFHT 2016



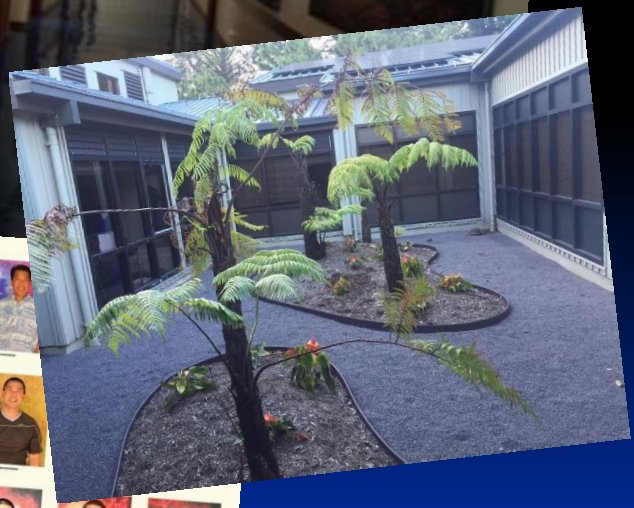


Completion of one of the largest engineering projects in CFHT's history – the dome shutter repair project

2013 *CFHT* 2016

CFHT – the first Maunakea Observatory to go solar…

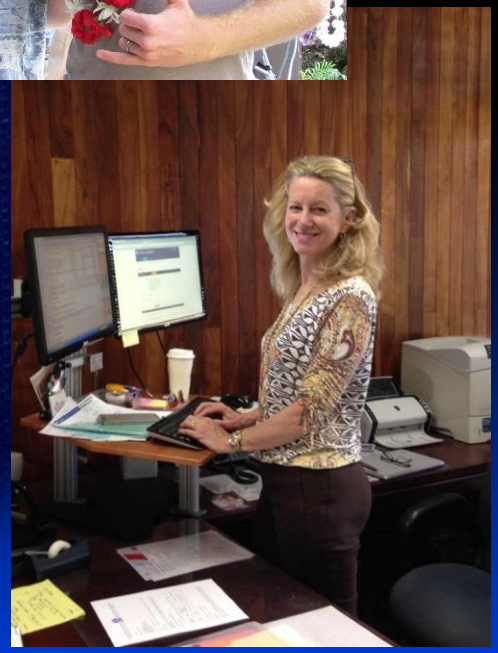
2013 CFHT 2016



A time of office remodeling, new lighting, new landscaping, and a new CFHT family portrait…


CFH
35 YEARS
2014

2013 CFHT 2016



Celebrated 35 fantastic years…

2013 CFHT 2016

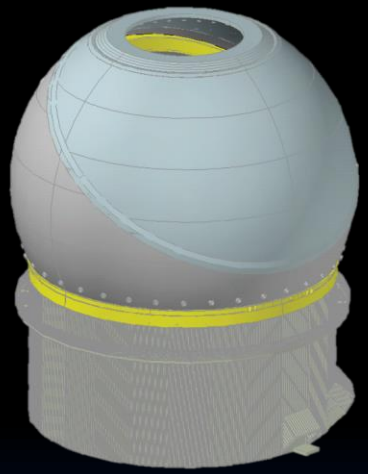
2013 CFHT 2016

CFHT's outreach program finds *overdrive*…

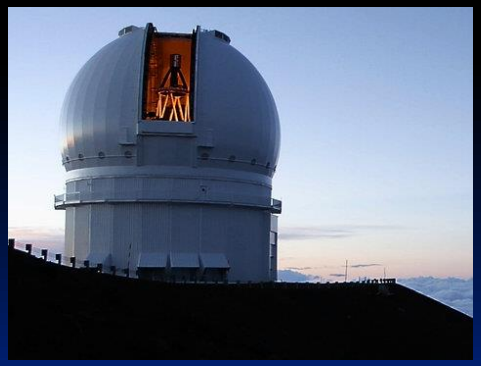
Mary Beth Laychak
Outreach Program Manager

Nadine Manset
Chair, MKAOC

2013 CFHT 2016



"The Next Generation of the CFHT: A Wide Field Spectroscopic Facility for the Coming Decade"
27-29 March – 'Imiloa Astronomy Center



CFHT Triennial Users Meeting
British Columbia
6-8 May 2013

ADASS XXIII
(Astronomical Data Analysis Software & Systems) Conference in Waikoloa
November 2013

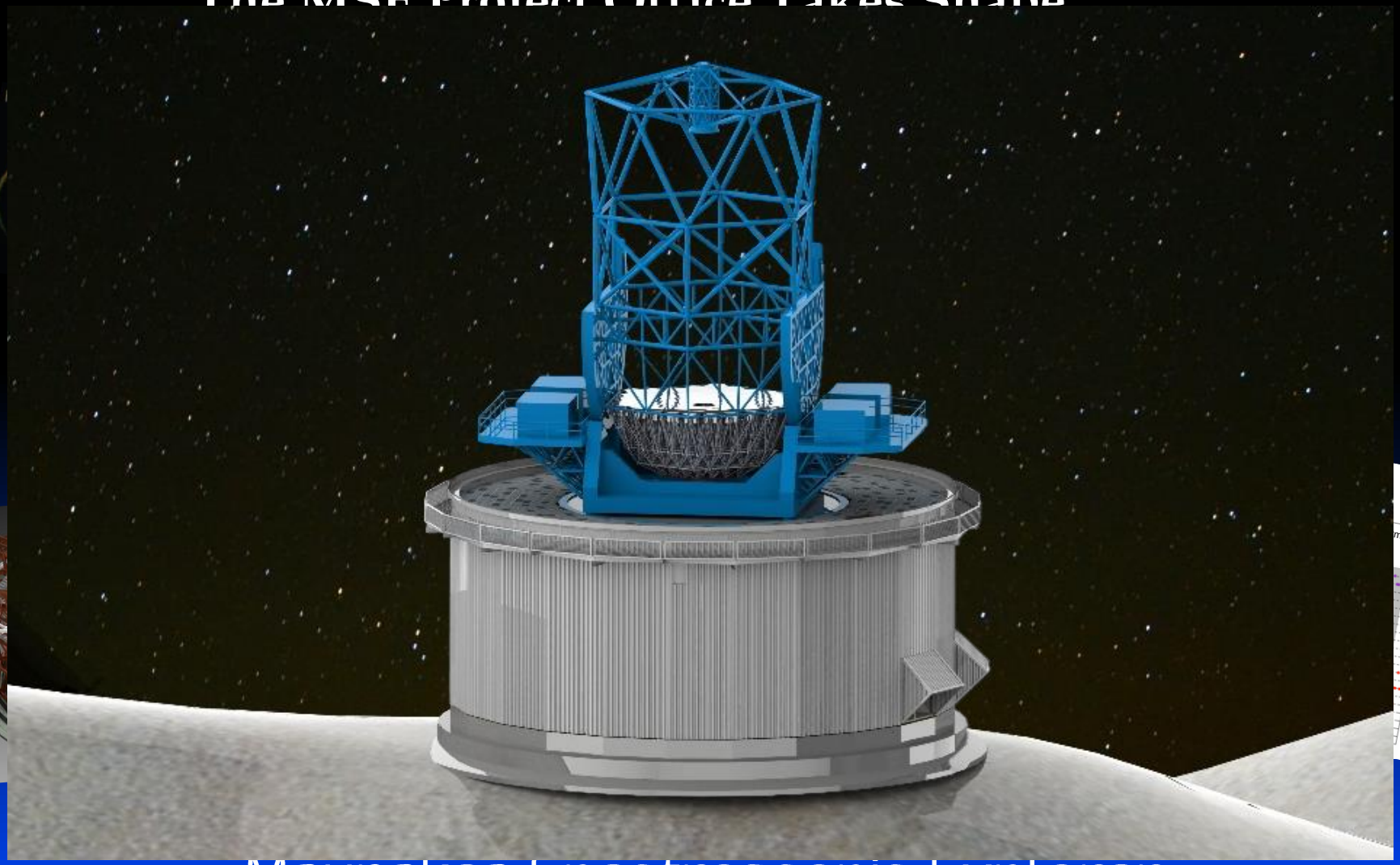
ADASS
conference series

2013 CFHT 2016

The MSE Partnership Grows, and Grows…

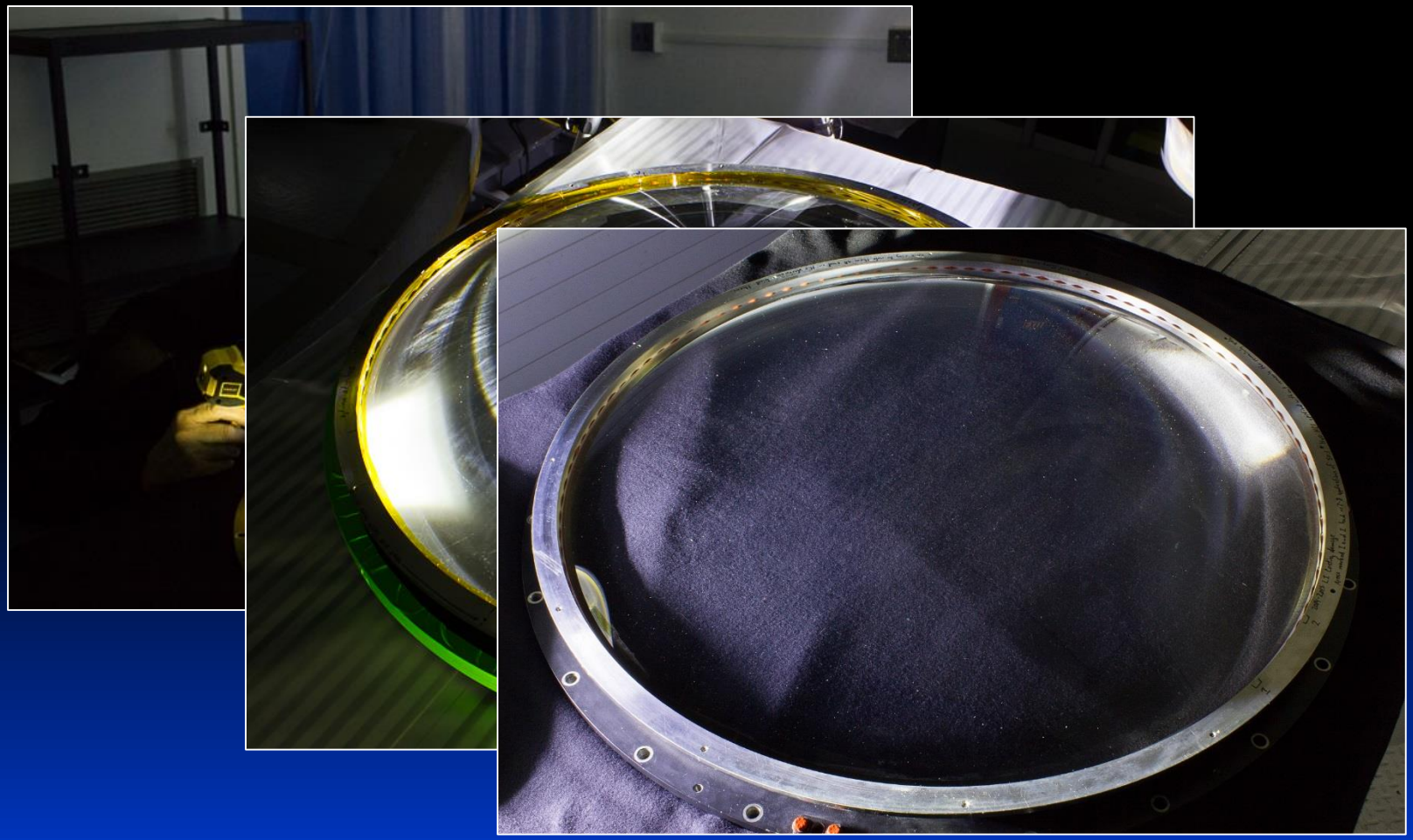
2013 CFHT 2016

The MSE Project Office Takes Shape



Maunakea Spectroscopic Explorer

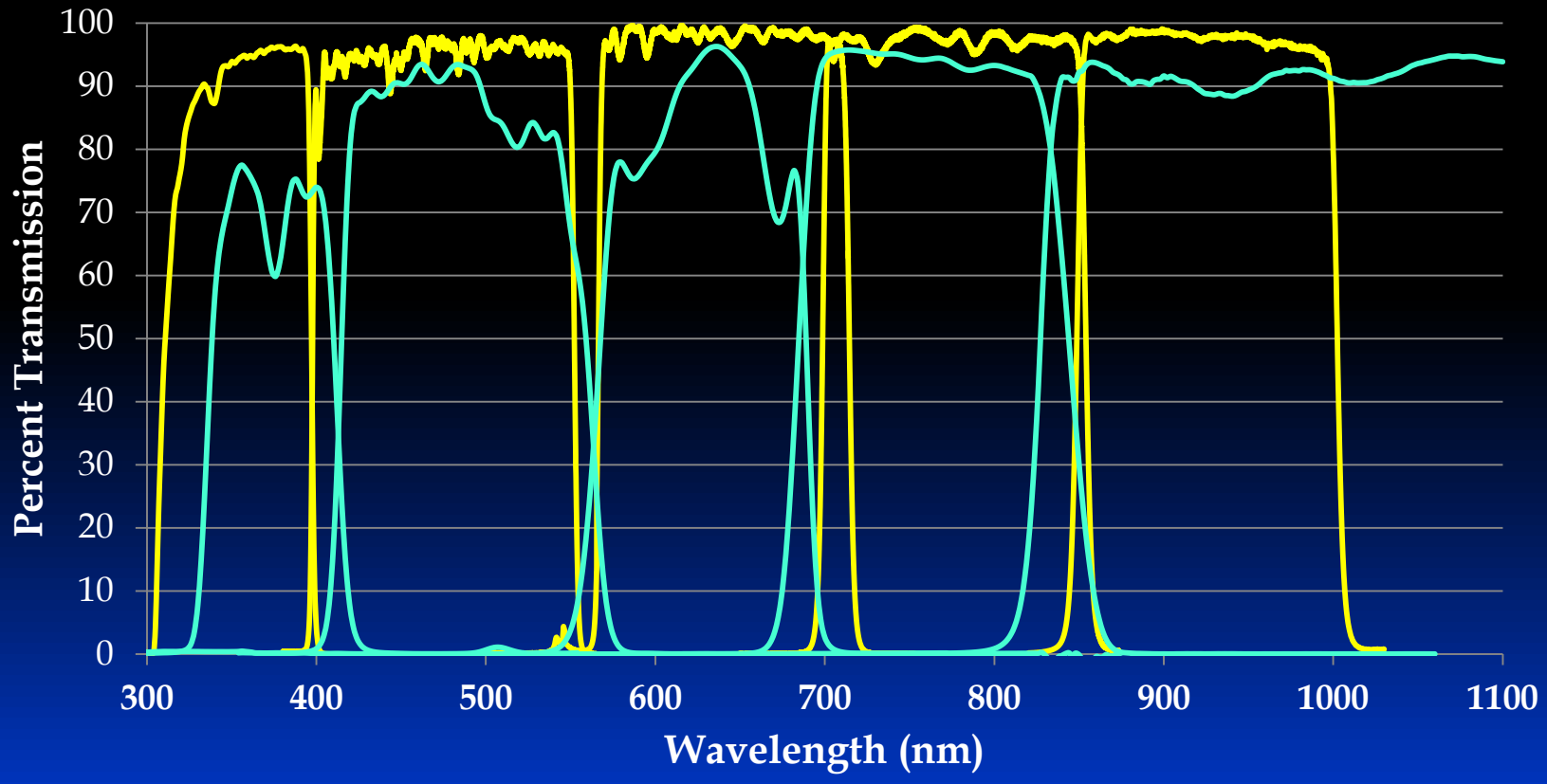
2013 *CFHT* 2016



MegaCam Repairs, Upgrades, and Successes

2013 CFHT 2016

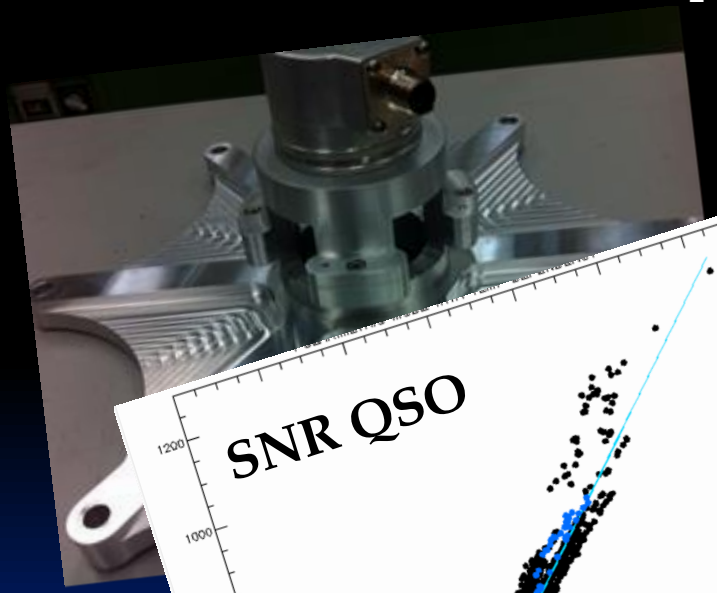
New vs. Old MegaCam Filters



MegaCam Repairs, Upgrades, and Successes

2013 CFHT 2016

Lots of advances in operations, including SNR QSO, ETC enahncements, and a new Telescope Control System at CFHT (at long last)!

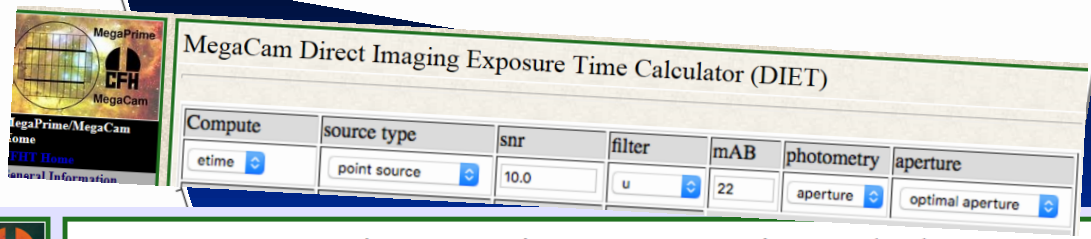


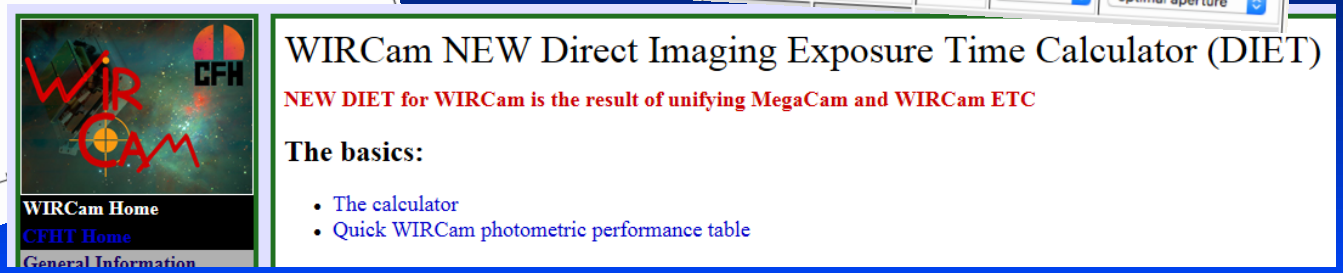
Tue 4/21/2015 5:45 PM
Windell Jones <jones@cfht.hawaii.edu>
To Obslog
TCS V following errors last night

Aloha Everyone,

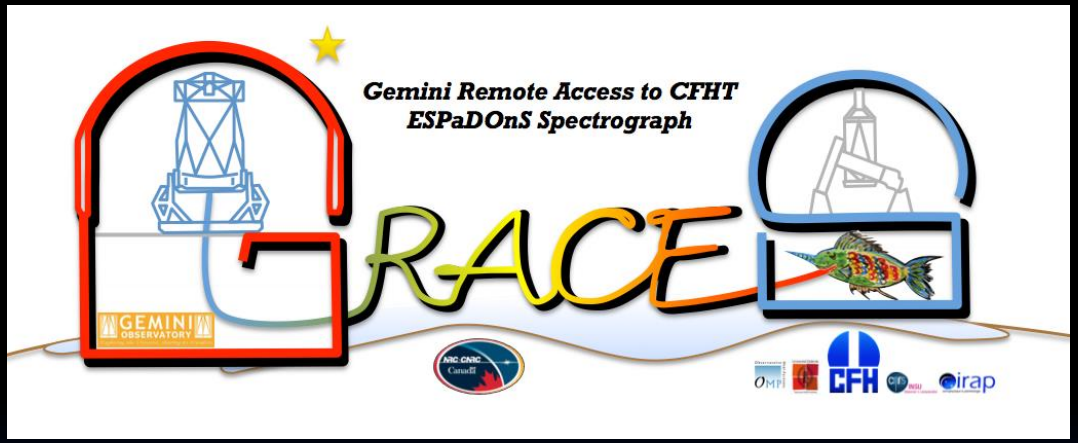
In response to the following error drop outs last night for HA, we increased the following error limit from 100 arc-sec to 200 arc-sec. DEC is already set to 400 arc-sec so it is the same. When the following errors have occurred recently, they are so brief that we aren't catching them in our logs so this is an experiment to see if the dropouts go away or reduce in frequency. Right now it looks like we get about two drop outs a night. In which a simple servo clear and restarting the queue seems to fix just fine.

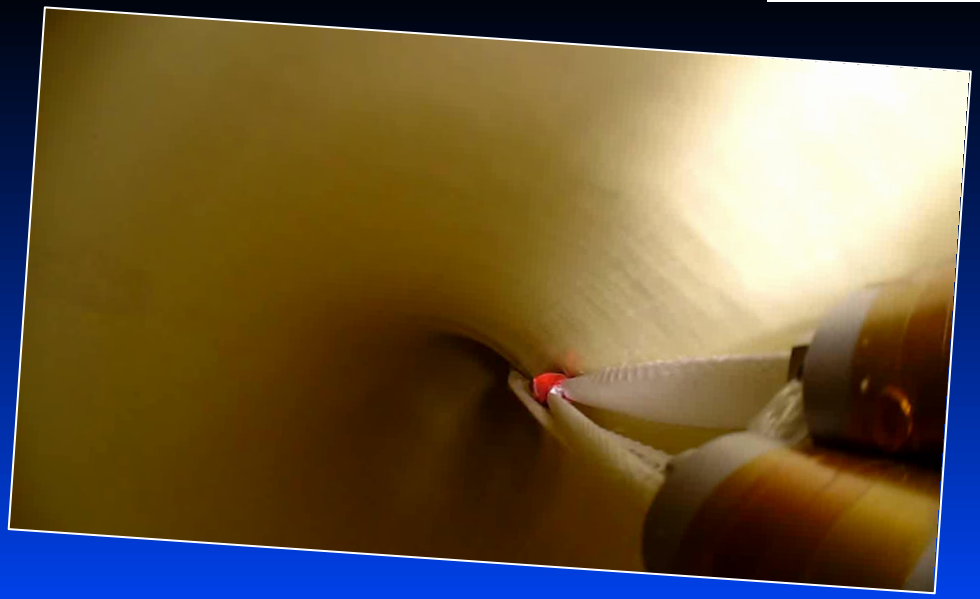
Windell & Kev

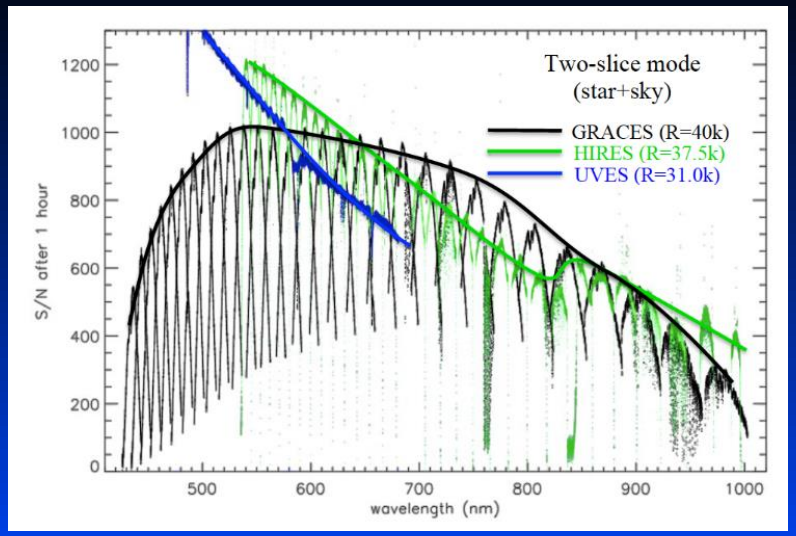




2013 CFHT 2016

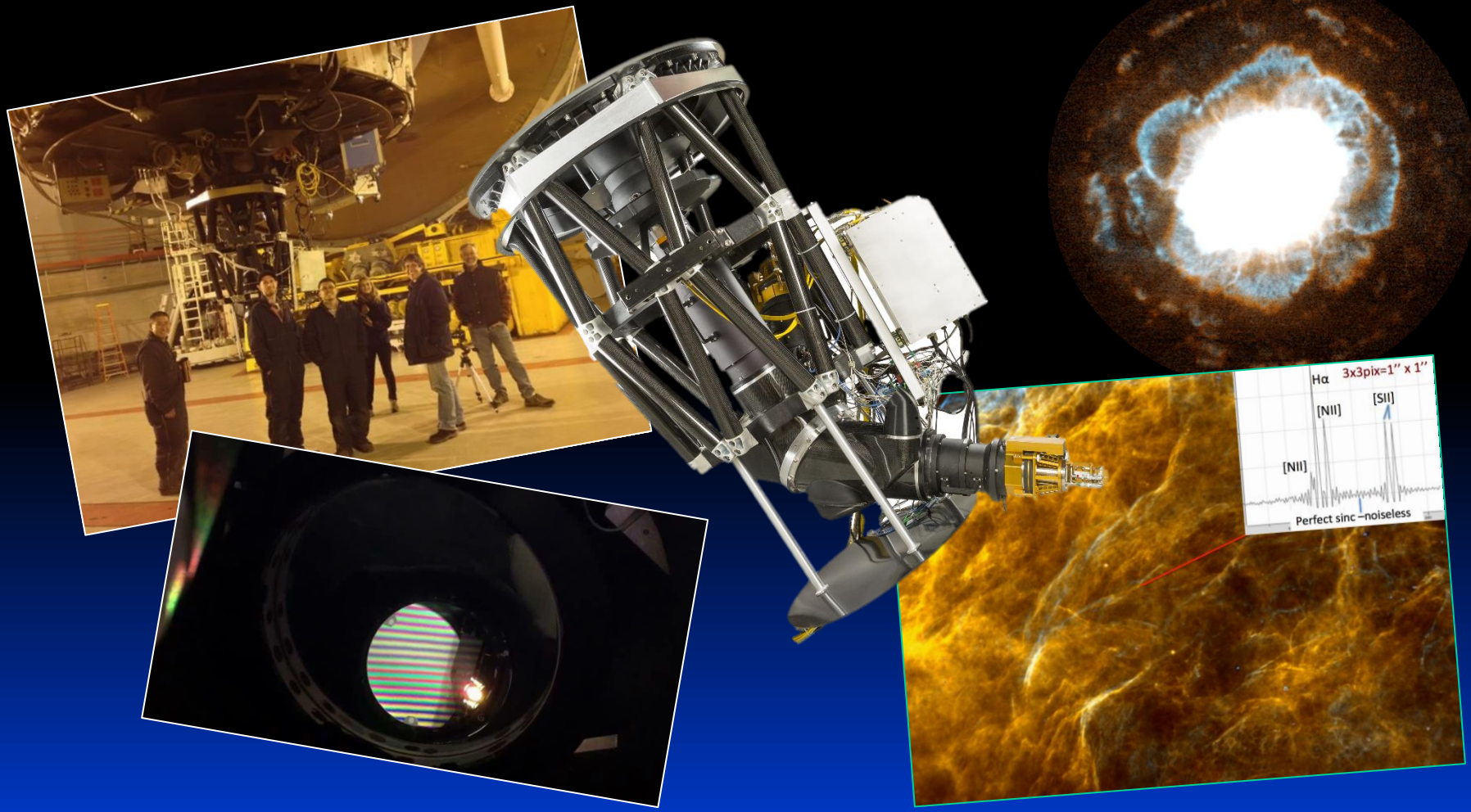






2013 CFHT 2016

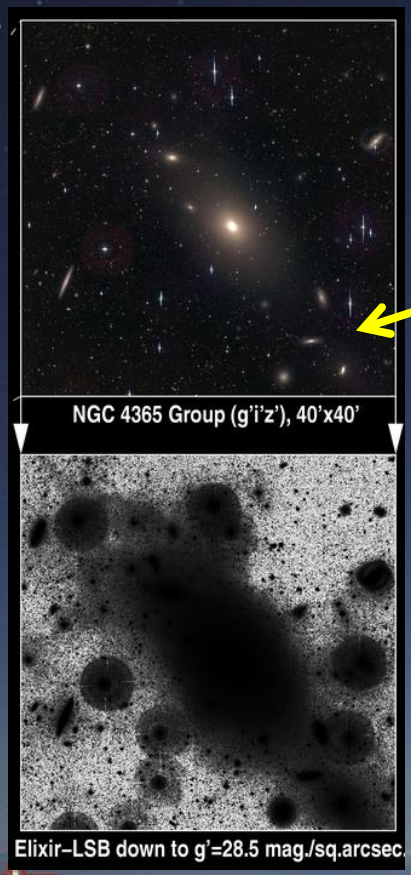
2013 CFHT 2016



SITELLE arrives at CFHT and marks the beginning of an era of imaging Fourier Transform Spectroscopy in astronomy!

2013 *CFHT* 2016

Incredible Surveys – Fantastic Science…



NGVS

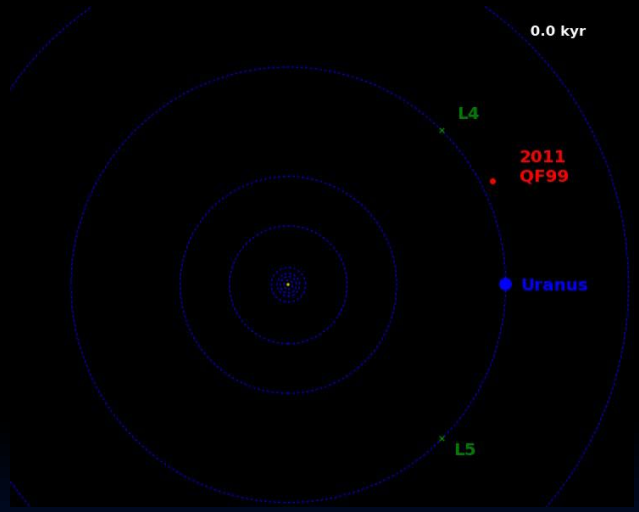
The Next Generation Virgo Cluster Survey

The NGVS as it would appear in the sky
Photo Jean–Charles Cuillandre (2010)

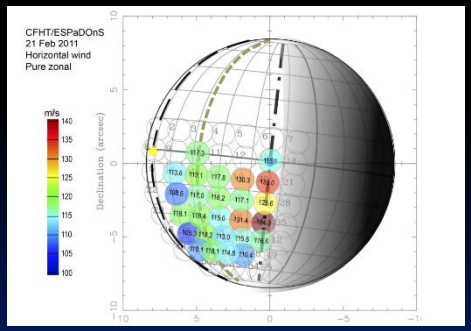
CFH

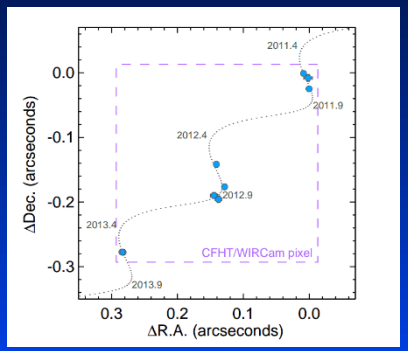
2013 CFHT 2016

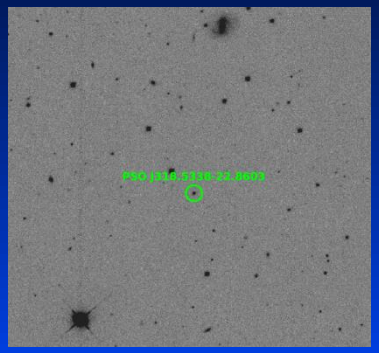
Redefining the Solar System Frontier



OUTER SOLAR SYSTEM ORIGINS SURVEY





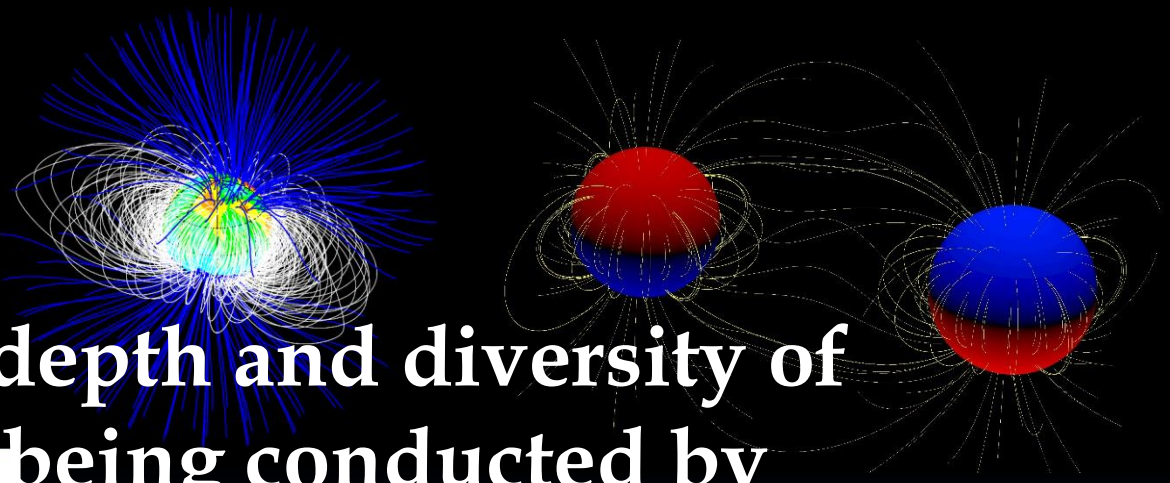


Exquisite astrometry, free floating planets

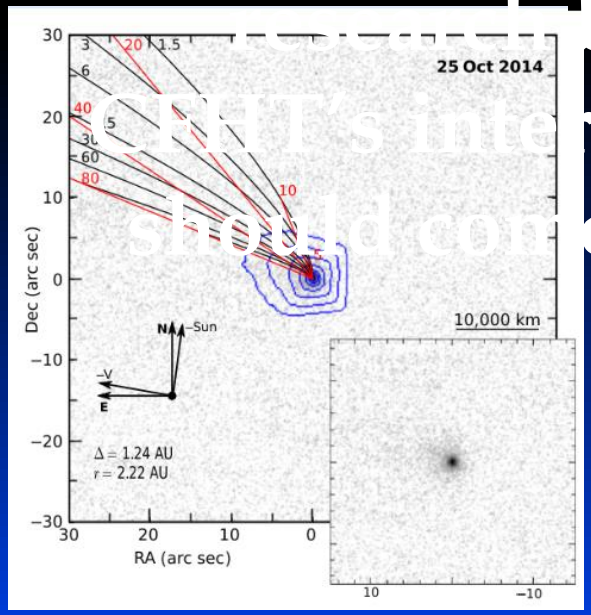
Mapping Dark Matter in 3D

2013 CFHT 2016

CFHT leading the way in measurements of stellar magnetic fields…



Given the depth and diversity of [illegible] being conducted by CFHT's international community, it should come as no surprise that…



A rare "frozen" asteroid

2013 *CFHT* 2016

CFHT has played another important role in astronomy…

2013 CFHT 2016


An artist's rendering of the Thirty Meter Telescope at sunset.

Not-so-common ground

TMT forum highlights gap between science, culture

By TOM CALLIS
Hawaii Tribune-Herald

COLEMAN

MANGAUIL


Hawaii Tribune Herald

Friday, April 3, 2015

Proudly serving Hilo and the Big Island since 1923

75 cents

PROTESTERS ARRESTED

Spirit of aloha pervades as police break up TMT roadblocks

By TOM CALLIS
Hawaii Tribune-Herald

ABOVE: A TMT protester chants a Hawaiian mele as she is arrested by DLNR police officers for disobeying a closure order, an officer while protesting Thursday above the Mauna Kea visitor center.

RIGHT: A Hawaii County police officer shares ha, or breath, with TMT protester Mana Kapele before Kapele was arrested for obstructing a roadway while protesting.

HOLLYN JOHNSON/Tribune-Herald


Hawaii Tribune Herald

Friday, April 17, 2015

Proudly serving Hilo and the Big Island since 1923

75 cents

"Science and money do not supersede the sanctity of our mountain."

Plan floated for giant composter

Yearly operating costs estimated at $5 million

By BRET YAGER
West Hawaii Today

RESPECT MAUNA KEA

A TMT protester testifies during a University of Hawaii Board of Regents meeting on Mauna Kea Management Thursday afternoon at UH-Hilo.

HOLLYN JOHNSON/Tribune-Herald

Hundreds turn out to oppose TMT

UH Board of Regents listens to testimony

By CHRIS D'ANGELO
Hawaii Tribune-Herald

TMT protesters wait in line to get into a University of Hawaii Board of Regents meeting.

HOLLYN JOHNSON/Tribune-Herald

LAURA SWANSON/West Hawaii Today

Residents dump their green waste at the Kealakehe Transfer Station on Tuesday.


Hawaii Tribune Herald

Friday, April 24, 2015

Proudly serving Hilo and the Big Island since 1923

75 cents

Telescopes to be retired?

Talks in works for early decommission of up to three facilities on Mauna Kea

By TOM CALLIS and CHRIS D'ANGELO
Hawaii Tribune-Herald

NEXT MEETING

What: University of Hawaii Board of Regents meeting

When: 11:30 a.m., Sunday

Where: UH-Hilo Performing Arts Center

2013 CFHT 2016


nature

MOUNTAIN BATTLE

Plans to build one of the world's biggest telescopes on Mauna Kea in Hawaii are mired in conflict. Four people involved in the fight explain their diverse views.

BY ALEXANDRA WITZE

A lone, mournful note rings across the broad summit of Mau… the highest peak in Hawaii. Joshua Lanakila Mangauil low… conch-shell horn and begins to walk over the craggy volcanic rock. Behind him come a dozen other Native Hawaiian men and women, many carrying the red, white and blue state flag. Together, they sing traditional chants as they hike up a volcanic ridge, headed for the top of… p…

On this July day, Mangauil is leading a reverent but s… visit t… 4,200-metre-high summit. Native Hawaiian tradition calls… pay their respects to the sacred *mauna*, or mountain, and then… group planned to stay a few hours, then get back into its pickup trucks and drive to a camp farther down. There they would resume the task that has consumed Mangauil and others for the greater part of a year: protecting the *mauna* from an effort to build a massive telescope.

An international consortium plans to construct the Thi… Telescope (TMT) on top of Mauna Kea on Hawaii's Big Island. If… edge astronomical facility, it would have a light-gathering mir… bigger than any of the 13 other telescopes already on the mountain, which include some of the largest and most scientifically productive observatories in the world.

TMT construction began in April and stopped almost immediately when demonstrators led by Mangauil blocked the vehicles from reaching the summit. They say that the TMT would violate both a fragile ecosystem and indigenous rights that have not been properly valued by astronomers. "Before you look into space, you need to respect this place," Mangauil says.

The battle that erupted this year echoes previous clashes. Native Hawaiians, environmentalists, scientists and other interest groups have wrangled for decades over the environmental and cultural impacts of the summit telescopes (see 'Peak passions'). But the fight over the TMT has grown larger and more divisive than past debates. Thanks to a renaissance of Native Hawaiian pride and the flashpoint potential of social media, the protests have tapped into broader anger against the US government and its past behaviour towards the islands and their native peoples.

Mangauil is adamant that the telescope should not be built — but others have equally passionate, divergent perspectives. Here, *Nature* talks to four people living in Hawaii and involved in the controversy, whose differing viewpoints reveal the complexity of finding common ground and securing the future of astronomy there.

Joshua Lanakila Mangauil

24 | NATURE | VOL 526 | 1 OCTOBER 2015

The conflict over TMT last year was unprecedented in many ways, revealing rifts in the Hawaii community that are as complex as they are deep. Steeped in symbolism, the future of Maunakea for the people of Hawaii portends in important ways the future of 21st century astronomy.

2013 CFHT 2016

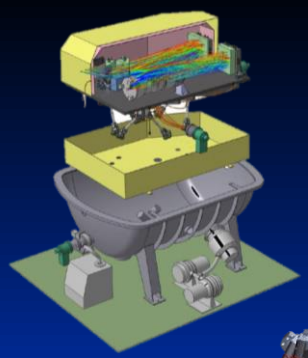
2013 CFHT Users' Meeting
Painter's Lodge, BC

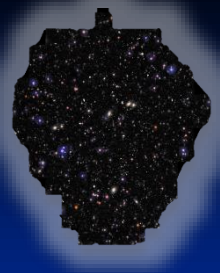
2016 CFHT Users' Meeting
Hotel Le Saint Paul, France

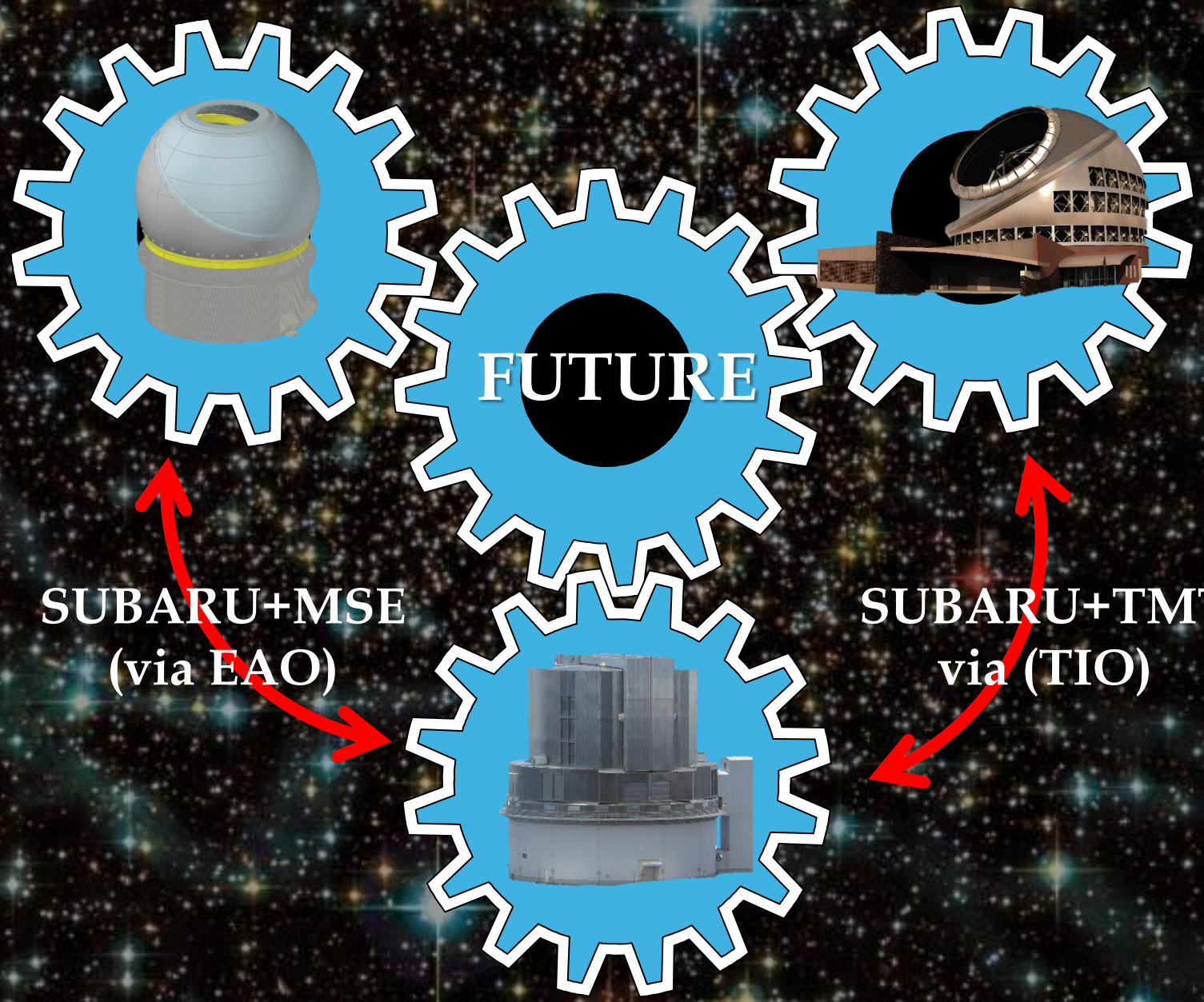
You might say we've all been busy since we last met at Campbell River! After that retrospective, let's look at what's on our forward horizon…

Strategy ⟶ Objective

Facility Evolution ⟶ **Facility Transformation**






FUTURE
SUBARU+MSE
(via EAO)
SUBARU+TMT
via (TIO)


Pan-Pacific
Maunakea
Where earth meets sky, past meets future, science unites with culture
Culture
Environment
Astronomy
Observatory


MAUNA KEA
COMPREHENSIVE MANAGEMENT PLAN
UH MANAGEMENT AREAS
Master Lease
Expiration Date:
2033
W. M. KECK OBSERVATORY
Time
Exchange
GEMINI
OBSERVATORY
SUBARU TELESCOPE
MAUNAKEA
OBSERVATORIES
MSE
THINK fund
at HAWAI'I COMMUNITY FOUNDATION
ENERGY
DRAIN
SAVING
MACHINE
MKO Science Impact
4000
3500
3000
2500
2000
1500
1000
500
0
Keck
UKIRT
CFHT
VLT
Subaru
Mayall
VLA
NTT
MMT
Gemini
Magellan
CBT
Blanco
JCMT
ESO3p6
eVLA
AAT
Arecibo
HET
WIYN
SOAR
LBT
SALT
EACOA
East Asia Core Observatories Association

MAUNAKEA OBSERVATORIES

Diverse Capabilities Enable Comprehensive & Collaborative Research

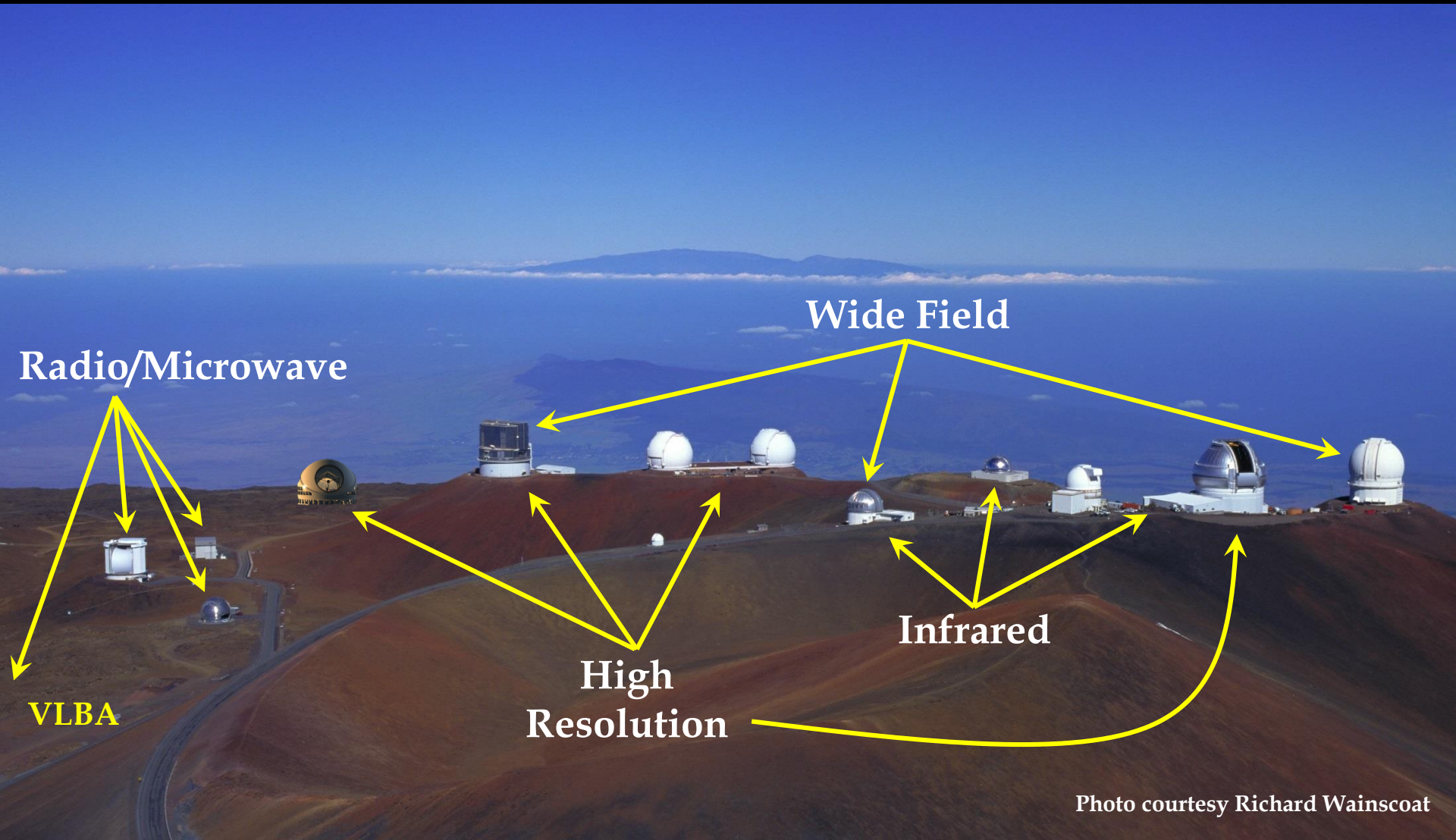


Photo courtesy Richard Wainscoat

MAUNAKEA OBSERVATORIES

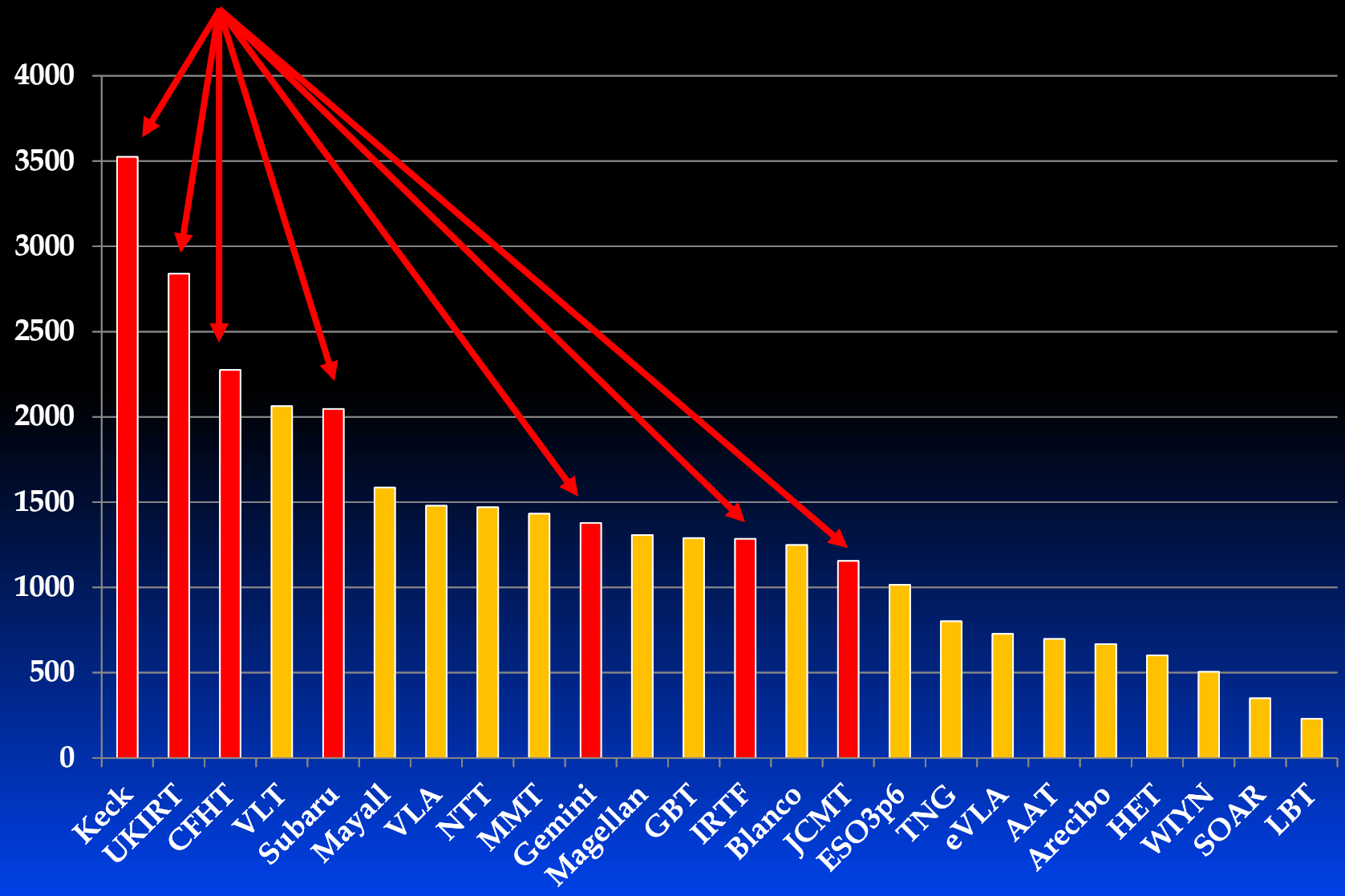
Diverse Capabilities Enable Comprehensive & Collaborative Research

Photo courtesy Richard Wainscoat

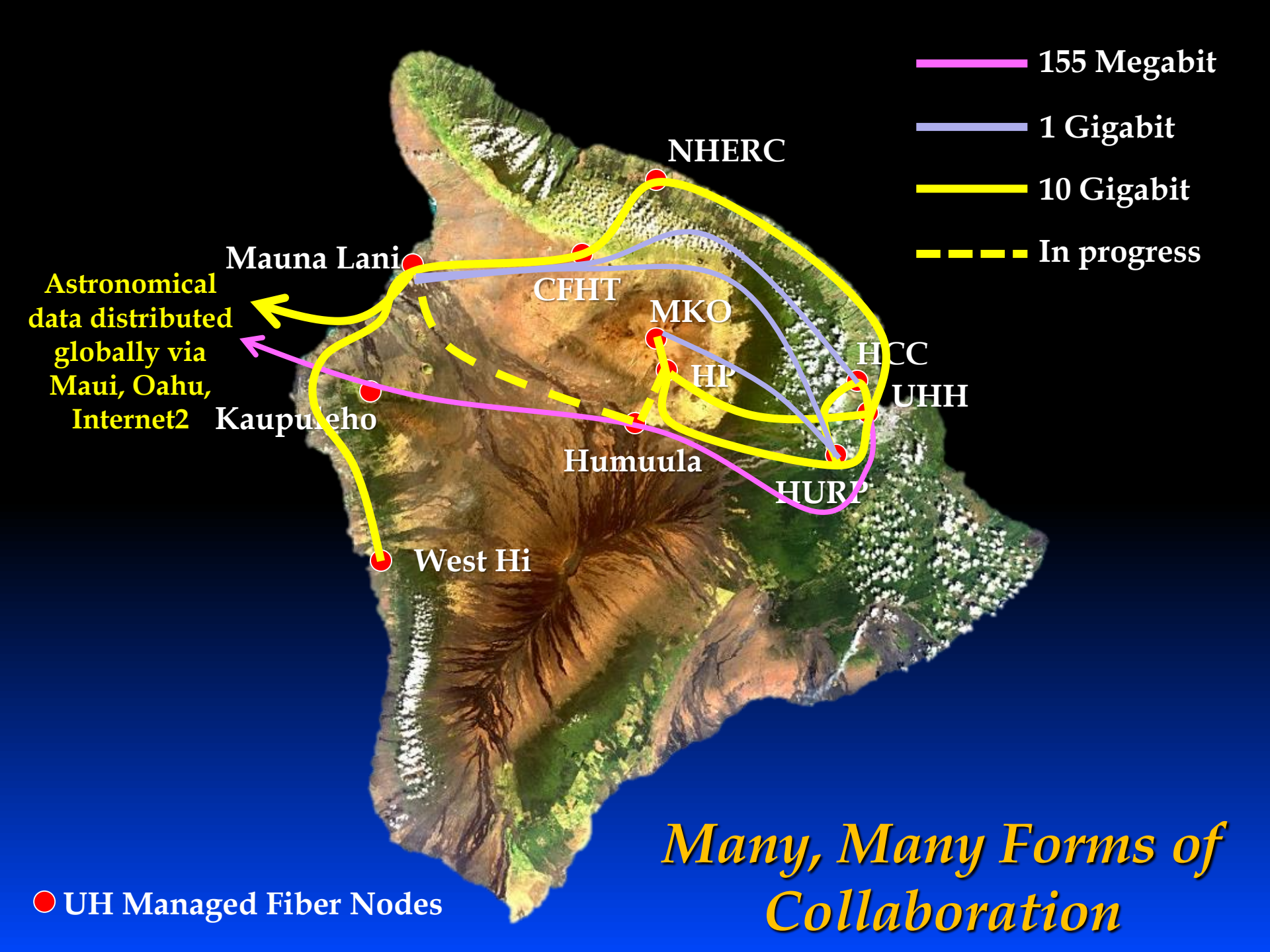
MAUNAKEA OBSERVATORIES

Total Science Impact per Telescope

(2015 – Courtesy D. Crabtree)



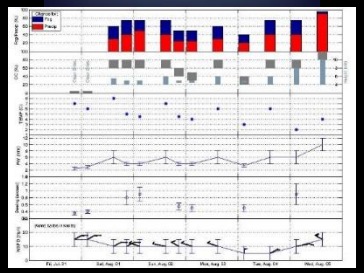
Many, Many Forms of Collaboration


155 Megabit
1 Gigabit
10 Gigabit
In progress
NHERC
Mauna Lani
CFHT
MKO
HCC
UHH
HP
Kaupuehoe
Humuula
HURP
West Hi
Astronomical data distributed globally via Maui, Oahu, Internet2
UH Managed Fiber Nodes
Many, Many Forms of Collaboration

MAUNAKEA OBSERVATORIES

Many, Many Forms of Collaboration

MKWC
mauna kea weather center

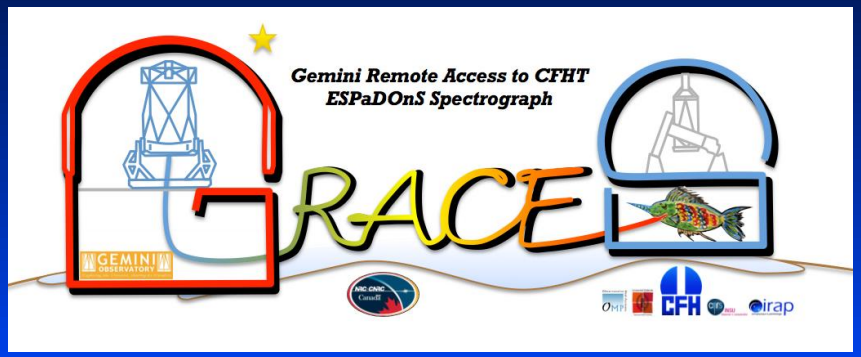


Road Ice Sensor

Aircraft Transponder Receiver (TBAD)

Seeing Monitor

All-Sky Cameras



MAUNAKEA OBSERVATORIES

Past & Future Trends

- **Though the Maunakea Observatories began as substantially independent facilities, an inescapable conclusion about their evolution is that collaborative operations and development has steadily increased over time**
- **This trend is surely going to continue into the future**
- ***The main question is what will it ultimately yield and what will be the "seed" of much greater collaboration in the future?***

MAUNAKEA OBSERVATORIES

UH's Newfound Role

UH is now an owner/operator of nearly half the telescopes on Maunakea…

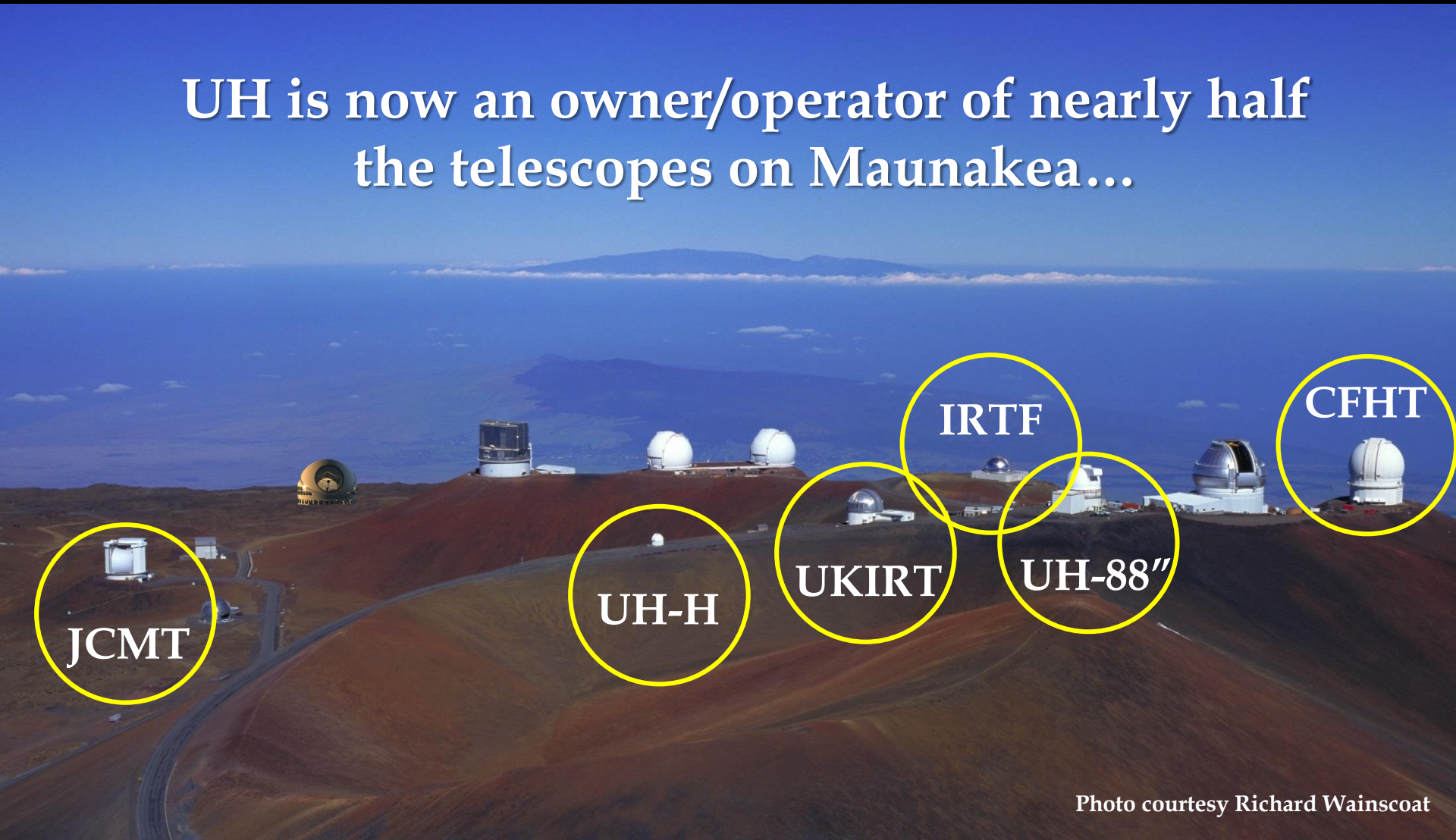
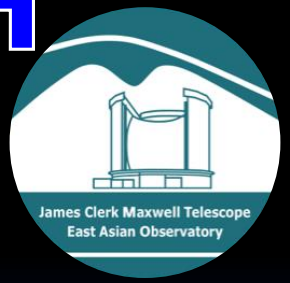


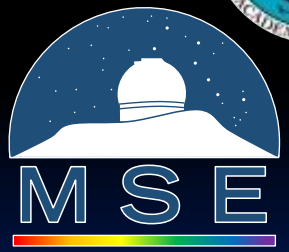
Photo courtesy Richard Wainscoat

MAUNAKEA OBSERVATORIES

East Asian Investment in Maunakea Facilities

MAUNAKEA OBSERVATORIES





W. M. KECK OBSERVATORY
On the summit of Mauna Kea, Island of Hawai'i

PAN-PACIFIC OBSERVATORY

On track now

- Humanity's prime portal on the universe ✓
- A combination of small, medium, large, and extremely-large telescopes functioning as a single efficient research facility ✓
- International in nature, working as a alliance of observatories with a vibrant, shared, local staff, common infrastructure, coordinated operations, strategically aligned instrument development, pooled resources in many areas ✓
- A catalyst for other high-tech entities in Hawaii through world class outreach and workforce development ✓
- A one-stop-shop for 21st century astronomy…

MAUNAKEA OBSERVATORIES

Possible Approach

- Phased transition –
  - Initially keep operations funding separate but merge fraction of MKO development budgets together, consistent with agreed long term strategy of facility development and specialization in a merged suite of capabilities
  - Pan-Pacific Observatory Council, with representation from all MKOs, would determine nature, scope, and timing of increased collaboration
  - Use existing time exchange program as a model for increasing time exchange across all PPO telescopes
  - Ramp up merging of development and resource sharing (staff, outreach, etc.) over time
  - Take advantage of all the infrastructure we already share
- No need to adopt an ESO like model based upon international treaties – we can achieve great gains in scientific productivity and cost effectiveness through a PPO "umbrella" agreement


WE ARE
MAUNA
KEA

A Year into this, Some Lessons Learned

- **Importance of being "present" in an island culture is enormous**
  - **Just showing up at community meetings is a big step forward – people want to at least be heard, even if agreement isn't possible**
- **Appreciate the bandwidth of the coconut wireless in an island community**
  - **Different from the mainland, where community boundaries are blurred by a more distant community horizon**
  - **Everyone knows everyone at some level (2 steps removed on the Big Island)**

A Year into this, Some Lessons Learned

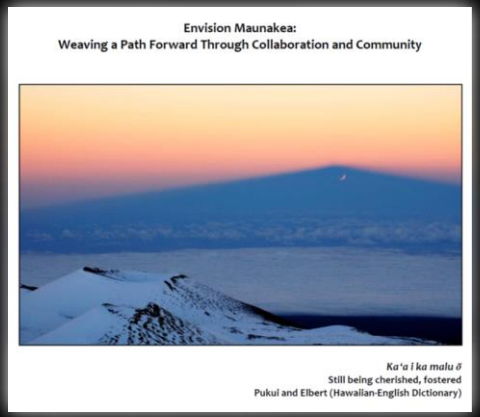
- **Relate at an emotional level with the Hawaiian community – don't get stuck in logic land**
  - **Let's talk about our kids who represent the future of our islands (not $, economy, discovery, etc.)**
- **Keep our message positive, speaking from a position of leadership, hope, vision, inclusiveness**
  - **Most people are looking for conflict resolution, which is hard to find in a negative campaign designed to make winners/losers, which is counter culture in Hawaii**
- **Do more than talk-the-talk – deliver on our words and focus on our message…**

KAMA'AINA OBSERVATORY EXPERIENCE

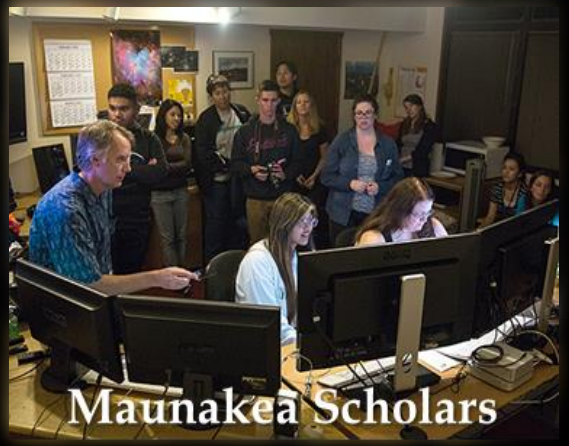
Community Meetings

JOURNEY through the UNIVERSE

Extends to Honoka'a and beyond…



Envision Maunakea



- Third Saturday of each month (starting Jan. 16), free tours of 2 telescopes given to Hawaii residents
- Tour includes -
  - Lunch at Halepohaku
  - Cultural/Environmental training
  - Transportation from VIS to/from summit
  - Opportunity to see 2 telescopes, talk to staff, etc. by 24 residents in each tour
- KOE Collaboration -
  - Imiloa reservation system, cultural components
  - UH/MKSS rents 4WD vans
  - OMKM rangers (safety) and environmental education
  - VIS interpretive guides and logistics
  - Bennet Group media support, custom signage, brochures, etc.
  - Moore Foundation funding
  - MKO staff provide summit tours

White House "Astronomy Night" (Oct. 2015) during which President Obama announced the formation of KOE

Mahalo Letter from the Maunakea Observatories to President Obama Published in Newspapers Statewide

The Kama'aina Observatory Experience is the embodiment of core philosophies in the CMP and expressed by the Maunakea Observatories since the conflict arose last year.

By demonstrating to the public the melding of cultural, environmental, and scientific interests on Maunakea, in a highly memorable "experience", we build support and motivate the public to share theirs

KAMA'AINA OBSERVATORY EXPERIENCE

Media Tour – January 12

WEDNESDAY 1/13/16

Star Advertiser
THE PULSE OF PARADISE

BIG ISLE SCOPES OPEN FOR TOURS

The Mauna Kea community hopes to 'inspire a passion for astronomy' among humanity

By Timothy Hurley

LOCAL
LAWMAKER LOOKS TO BUILD KAU HALE
State Sen. Suzanne Chun Oakland would use the traditional structures to house homeless >> B1

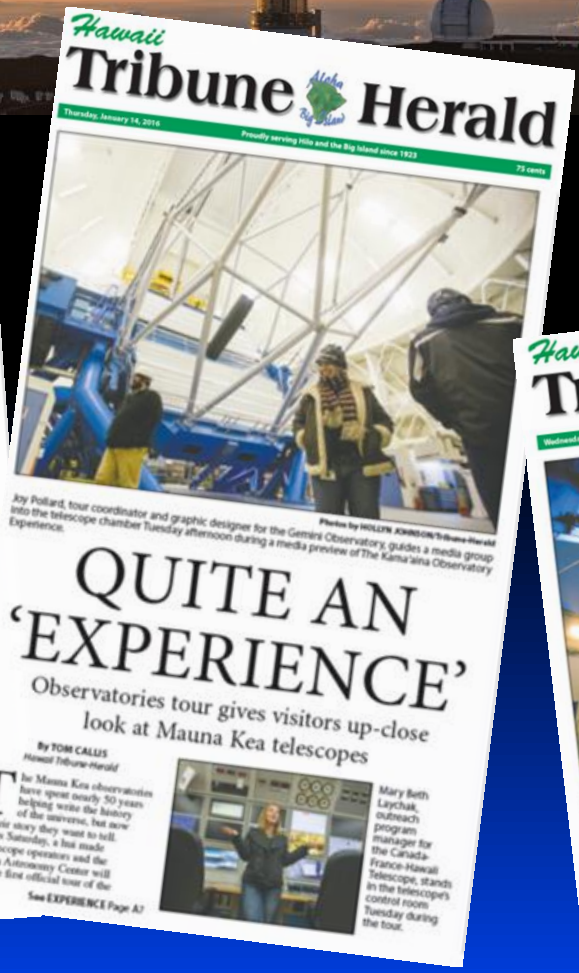
MONEY
HAWAII'S FIRST KMART IS CLOSING
A liquidation sale starts Thursday at the Iwilei store >> B5

SPORTS
FROM STAR PLAYER TO NBA COACH
Former UH standout Anthony Carter joins the Sacramento Kings' staff >> C1

State plans to relocate prison off Kalihi land

Ige's administration wants the crowded correctional center situated in Hakuea

By Sophie Cocke



Hawaii Tribune Herald

Thursday, January 14, 2016 — Proudly serving Hilo and the Big Island since 1923 — 75 cents

Photos by HOLLYN JOHNSON/Tribune-Herald

Joy Pollard, tour coordinator and graphic designer for the Gemini Observatory, guides a media group into the telescope chamber Tuesday afternoon during a media preview of The Kama'aina Observatory Experience.

QUITE AN 'EXPERIENCE'

Observatories tour gives visitors up-close look at Mauna Kea telescopes

By TOM CALLIS
Hawaii Tribune-Herald

The Mauna Kea observatories have spent nearly 50 years helping write the history of the universe, but now it's their story they want to tell.

This Saturday, a hui made of telescope operators and the Imiloa Astronomy Center will host the first official tour of the

Mary Beth Laychak, outreach program manager for the Canada-France-Hawaii Telescope, stands in the telescope's control room Tuesday during the tour.

See EXPERIENCE Page A7

Hawaii Tribune Herald

Wednesday, January 13, 2016 — Proudly serving Hilo and the Big Island since 1923 — 75 cents

HOLLYN JOHNSON/Tribune-Herald

Up close and personal

Media gets preview of Kama'aina Observatory Experience

The dome of the Canada-France-Hawaii Telescope on Mauna Kea is opened Tuesday during a media preview of the Kama'aina Observatory Experience. The free monthly tours start Saturday and are available exclusively to Hawaii residents. **An article about the tour will appear in Thursday's edition of the Tribune-Herald.** For more information or to make reservations, call 969-9703 or visit www.kamaainaobservatoryexperience.org.

KAMA'AINA OBSERVATORY EXPERIENCE

Inaugural Tour – January 16

Local TV Coverage

Video by

'Ōiwi TV

Cultural/Environmental Program

CFHT & Gemini Tours

MAUNAKEA SCHOLARS

- Program was conceived 2+ years ago as a means of providing, on a regular basis, high school access to the Maunakea Observatories for science fares, senior projects, and hands-on STEM education/training
  - Took a while to put all the pieces in place to launch in 2015/16…
- Starts each fall with mentors visiting select classrooms to provide guidance on research projects the students may be interested in pursuing
- Students design their own projects and compete for telescope time (just like professional astronomers)
- Students visit telescopes and get their own data in Waimea

MAUNAKEA SCHOLARS

HONOLULU Star Advertiser

DENNIS ODA / DODA@STARADVERTISER.COM

CHANCE OF A LIFETIME

A new program awards Kapolei students time at a powerful Mauna Kea telescope

By Rosemarie Bernardo

In what one described as a "once-in-a-lifetime opportunity," four budding astronomers on Wednesday learned they had won time using one of the world's most powerful telescopes.

"It's like winning a Grammy," said Jamie Valdez, 18, after the announcement of the winners at the Kapolei High School library. "We were so surprised. Like, I was shaking the whole time."

Four Kapolei students were named the inaugural winners of the Maunakea Scholars Program, believed to be the first of its kind in the United States that gives aspiring astronomers an opportunity to spend time at a major international observatory. The pilot program is a partnership between the Canada-France-Hawaii Telescope, the Gemini International Observatory, both of which are atop Mauna Kea, and the state Department of Education.

Doug Simons, director of the Canada-France-Hawaii Telescope, announced two groups of winners from Kapolei High. Each two-member team will spend an hour to an hour-and-a-half at CFHT's control room to further their research.

"This is a breakthrough program," said Simons. "It's a quantum leap."

Please see **WINNERS**, A3

Jamie Valdez, left, reacted with surprise at being named to the Maunakea Scholars Program. Fellow Kapolei High students David Zerbo, right, Ashley Cobbs, back left, and Nevyn Tyau, back middle, also were selected to participate in the program.

March 2 at Kapolei High School

MAUNAKEA SCHOLARS

Hawaii Tribune Herald

Wednesday, March 16, 2016 | Proudly serving Hilo and the Big Island since 1923 | 75 cents

HOLLYN JOHNSON/Tribune-Herald

From left, Waiakea High School students Ramsey Goodale, Ana Bitter, Hannah Blue and Kylan Sakata react to being chosen to be Maunakea Scholars for their proposal called "Exploring Star Formation in the Host of Radio-Quiet Quasars" during a Maunakea Scholars Proposal Selection Program luncheon in the school's library.

'You're all astronomers today'

Waiakea High students win opportunity to use Mauna Kea telescope

By TOM CALLIS
Hawaii Tribune-Herald

Many students are encouraged to shoot for the stars, but few get an opportunity quite like this.

As part of the inaugural launch of the Maunakea Scholars program, four seniors at Waiakea High School were told Tuesday they were awarded observing time on the Canada-France-Hawaii Telescope atop the mountain.

SIMONS

The new program, which organizers say isn't replicated anywhere else, is meant to open up some of the world's most advanced telescopes to Hawaii students and inspire the next generation of scientists.

Based on the excitement on the students' faces, that probably won't be a difficult task.

One student, Ramsey Goodale, placed his

See TELESCOPE Page A7

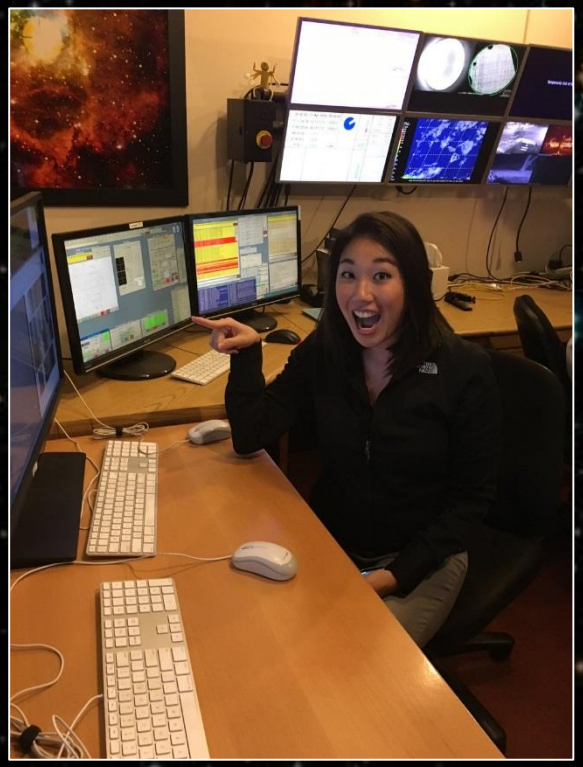
March 15 at Waiakea High School

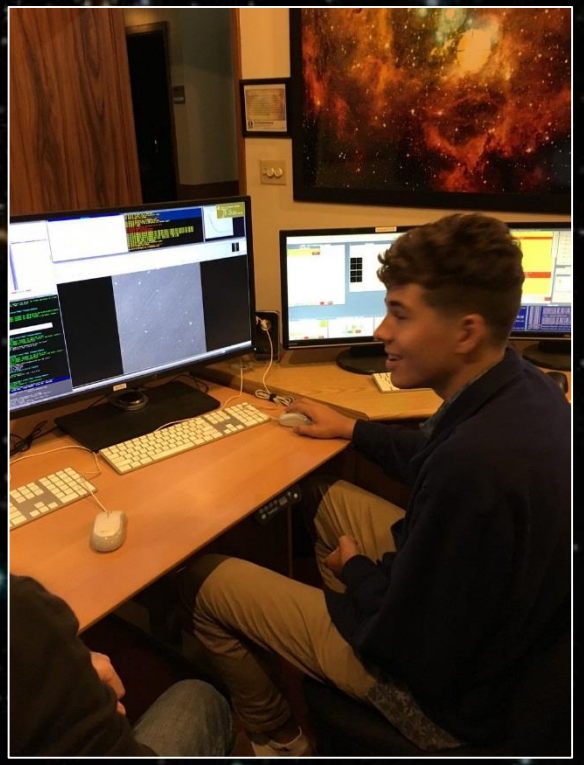
MAUNAKEA SCHOLARS

March 28 at Halepohaku and CFHT Headquarters in Waimea Making Their Observations

MAUNAKEA SCHOLARS

April 11 – Waiakea Students in Waimea Making Their Observations





MAUNAKEA SCHOLARS

Maunakea Scholars on KITV evening news after first scholars announced…

observations late March…

Is Any of This Doing Any Good?

1 Year Ago

In Recent Months

MKO's participate in Kuhio Day Celebration at Pana'ewa

Keaukaha

Pana'ewa

Kupuna tour

Emergin[illegible]

East Hawa[illegible]nities

[illegible]y voices in Great Astronomy Support During Merrie Monarch Parade

Is Any of This Doing Any Good?

- **In the end we may never know, given the layers of complexity that comprise the situation**
- **In any case, the Hawaii Island community network CFHT is cultivating through these programs will definitely help MSE**
- **My conversations with Hawaiian activists about MSE invariably turn into conversations about the future of astronomy in general (Master Lease) when they realize MSE is a relatively benign construction project on previously disturbed ground, developed by a well established Maunakea Observatory**

Where From Here?

- **Contested Case hearings need to yield a renewed permit for TMT by the end of this year**
  - **Driven by timetable of Japanese Federal funding cycle**
  - **TMT researching alternate sites, but moving TMT to a new site is arguably more difficult than persevering in Hawaii**
- **If TMT is not built in Hawaii, renewing the Master Lease is still feasible**
  - **Master Lease renewal involves a different argument than building a new telescope on a new site by a "mainland" organization**
  - **Everything CFHT is doing helps build community support for a new Master Lease and MSE**
- ***For MSE, the largest threat from TMT not being built in Hawaii is lack of confidence for investors in new Maunakea facilities***

Where From Here?

- **The Maunakea Observatories remain committed to ensuring a bright future for Hawaii astronomy well into the 21st century through a variety of initiatives and relentless engagement of the Maunakea conflict**
- **The path forward involves many steps, chief among them –**
  - **A unified voice and vision from the Maunakea Observatories for the future of Maunakea**
  - **Coordinated, repeated calls for the melding of culture, environment, and science on Maunakea**
  - **Unabashed support for community based management of Maunakea (OMKM, CMP, etc.)**
- ***The situation is serious but a lasting resolution enabling 21st century Hawaii astronomy is on the horizon…***

Where From Here?

Aloha ...

Maunakea Spectroscopic Explorer