

Canada France Hawai'i Telescope (CFHT)

Subaru Users Meeting FY2023

Jean-Gabriel Cuby
Executive Director



Agencies



National Research
Council Canada

Conseil national de
recherches Canada



Associate Partners



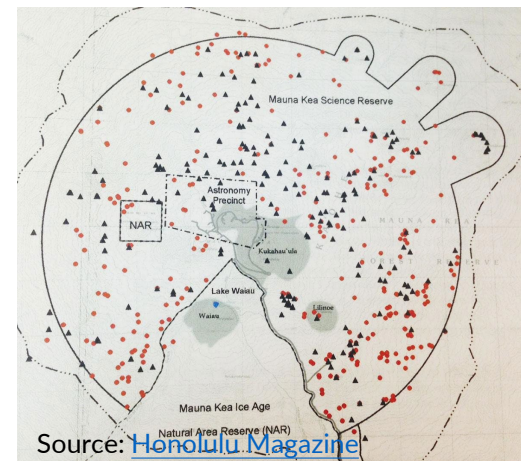
中央研究院
天文及天文物理研究所
ACADEMIA SINICA
Institute of Astronomy and Astrophysics



**National Astronomical Observatories
Chinese Academy of Sciences**

Acknowledgment

- CFHT operates on the land of the Kānaka Maoli people, on the summit of Maunakea
- There are hundreds of historic sites, archaeological remains, shrines and burials on its slopes and summit.
- We are committed to working closely with local communities in Hawai'i to define a shared governance model of community astronomy on Maunakea.

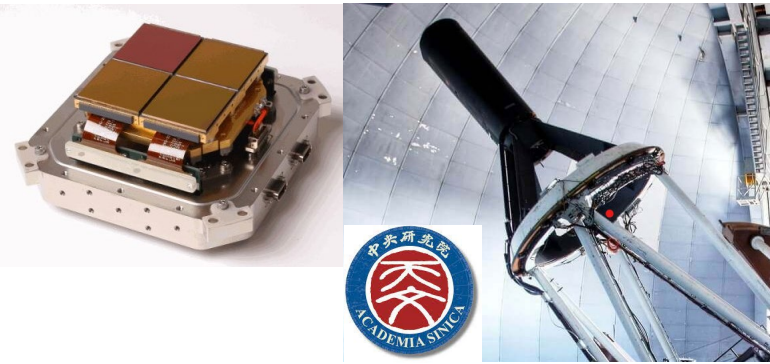




CFHT Instruments

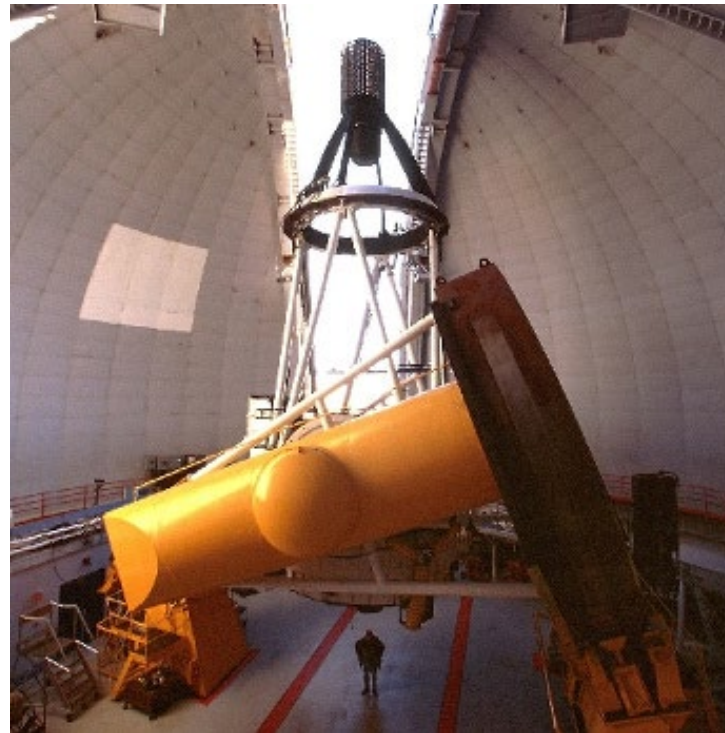
Prime Focus: WIRCam

- 20' x 20' NIR imager
- 128 Mpix @ 0.306 arcsec/pix
- Broad band and Narrow band filters



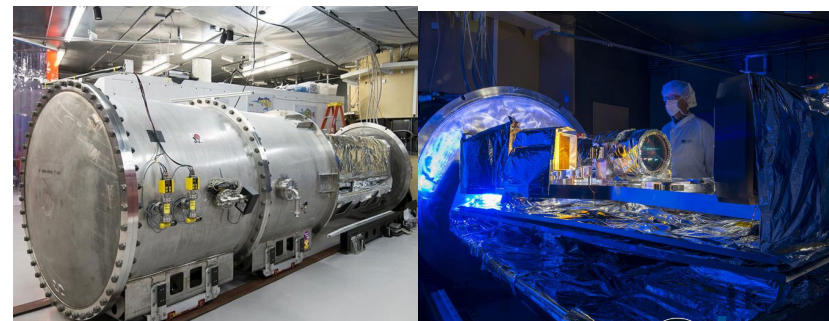
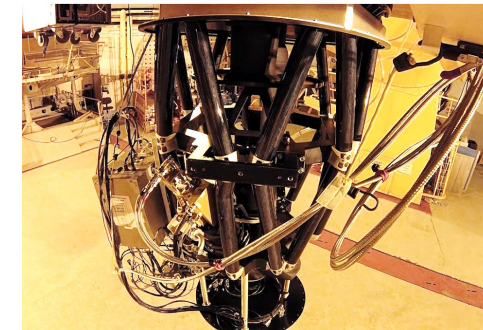
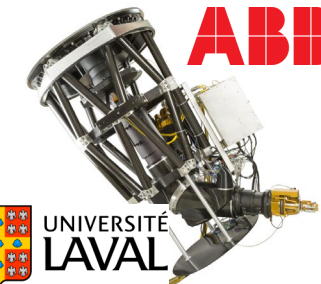
Prime Focus: MegaCam

- 1° x 1° optical imager
- 360 Mpix @ 0.189 arcsec/pix
- Broad band and NB filters



Cass: SITELLE

- 11' x 11' Fourier Transform Spectro-imager
- 350-900 nm
- 2k x 2k @ 0.32 arcsec/pix
- R = 6,000 – 10,000



SPIRou



National Research
Council Canada

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- High Resolution NIR spectropolarimeter
- 970-2490 nm - R = 70,000



ESPaDONs

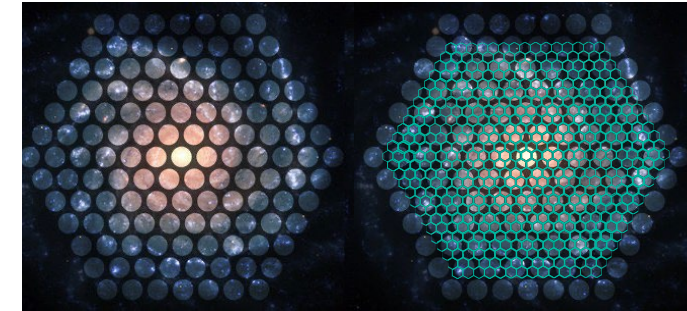
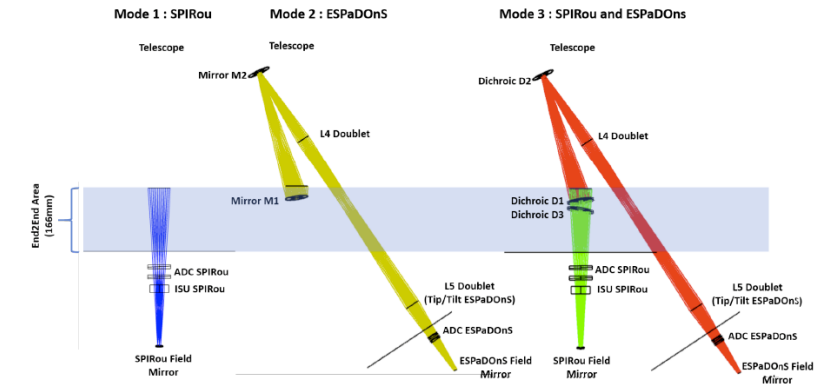
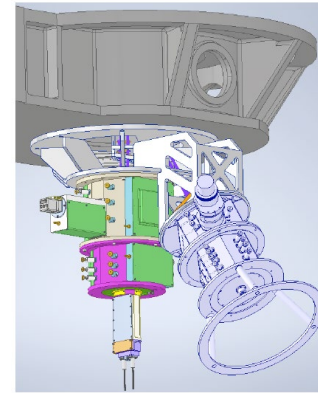
- High Resolution optical spectropolarimeter
- 370-10,000 nm
- R = 70,000

Instrumentation News

- Development of VISION: a new Cassegrain module feeding our two spectropolarimeters
- CFHT/IFU (pending funding)
 - 468 fibers, 1" lenslets, hexagonal configuration
 - Field diameter (26.5")
 - $R = 2000\text{-}5000$ spectrograph
- Issue with our crane, preventing us to exchange the top-end
- F/8 Cassegrain focus instruments. Three dark runs lost with MegaCam & WIRCam so far, two more will be lost.

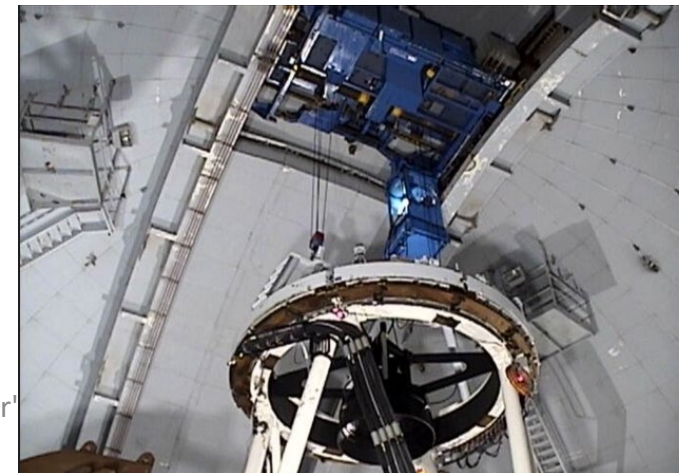
1/24/2024

Subaru User'



SDSS-IV/MaNGA

CFHT/IFU



Recent Science Highlights

Hawai'i Observatories Play Critical Role in Adding Color to the Euclid Space Mission

400+ nights with **MegaCam**
5,000 sq. degrees (u, r bands)



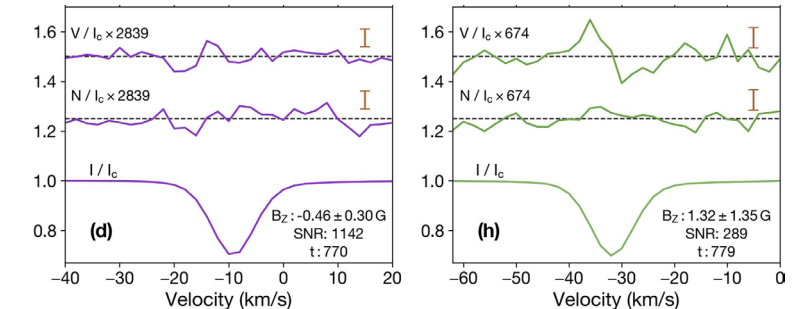
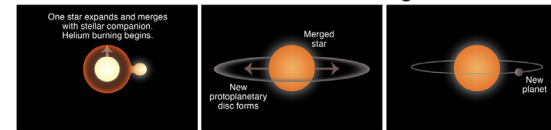
A close-in giant planet escapes engulfment by its star. (**ESPaDOnS**)

Hon et al., 2023, Nature 618, 917–920 (2023)

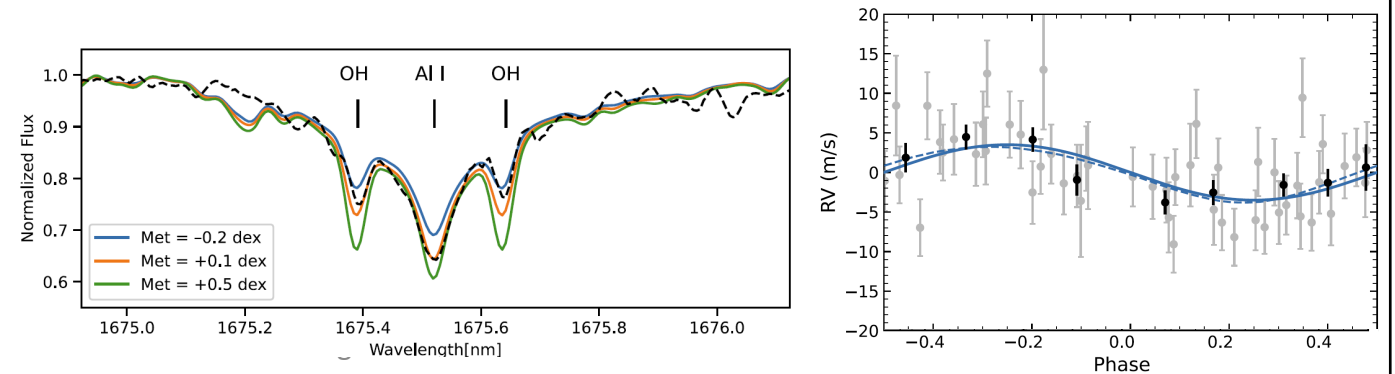
Scenario 1: **Planet escapes engulfment**



Scenario 2: **Planet forms from stellar merger**

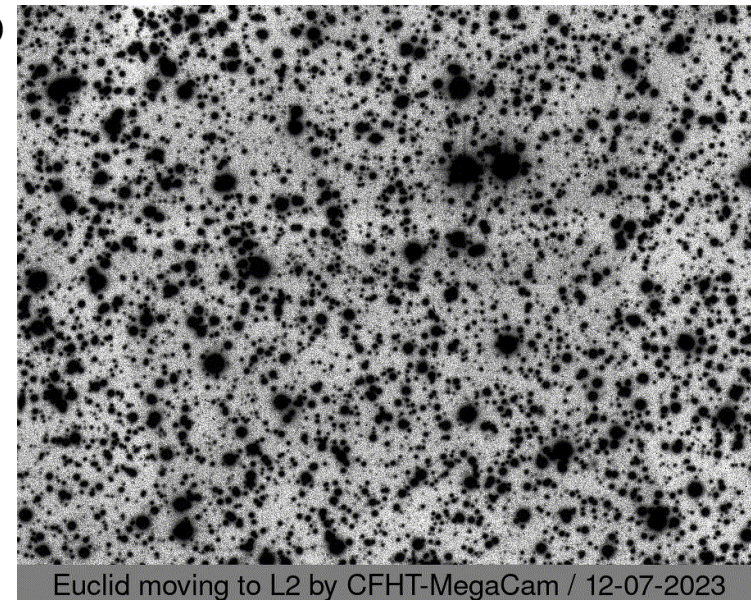
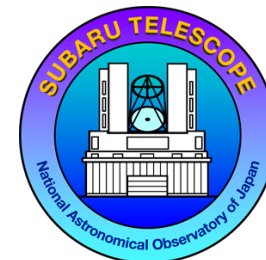


TOI-1452 b: **SPIRou** and TESS Reveal a Super-Earth in a Temperate Orbit Transiting an M4 Dwarf
Cadieux et al., 2022, 164:96



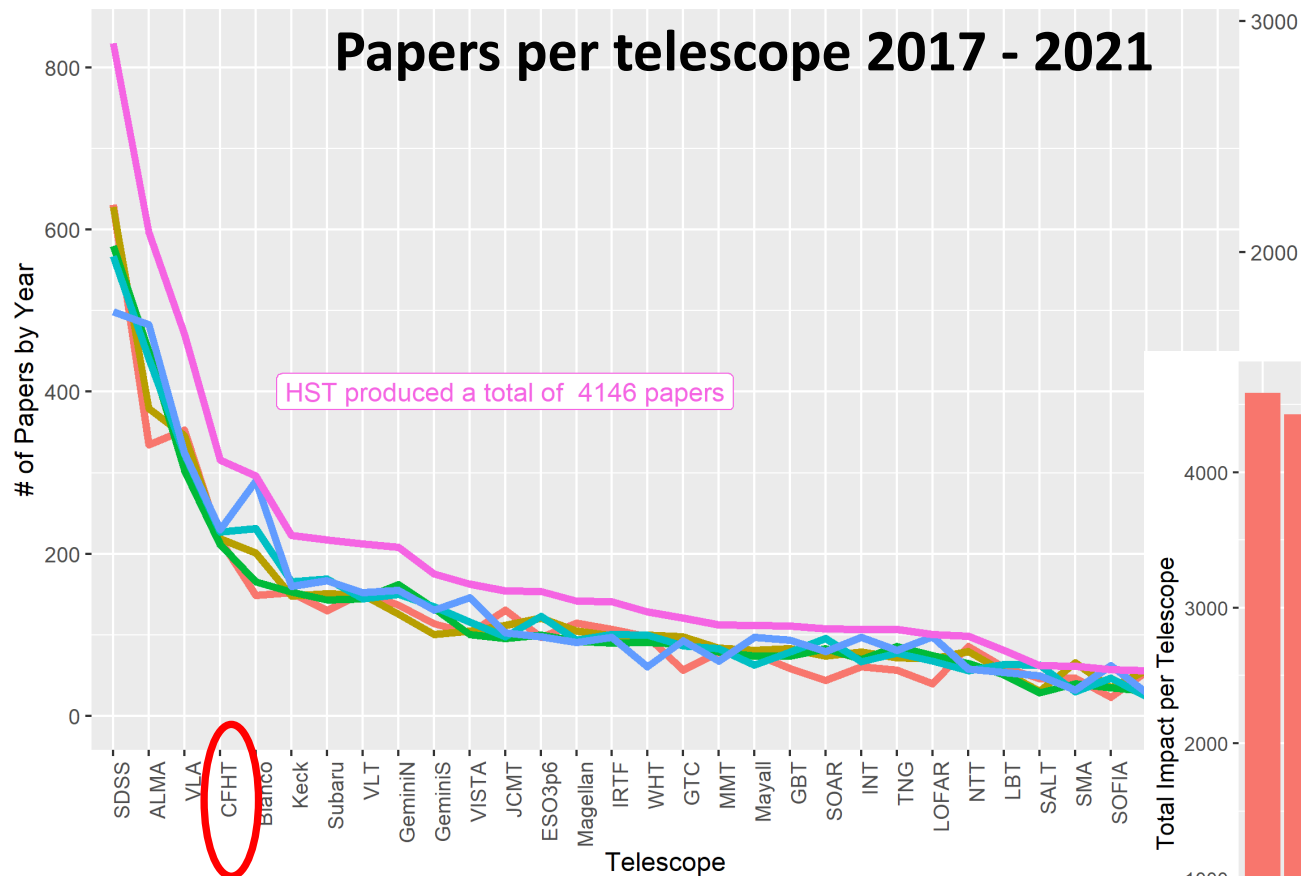
The Euclid year !

- Preparing Euclid has been a major endeavor for CFHT, Subaru and Pan-STARRS.
- Through UNIONS (WISHES), Canada, Japan and UH could join Euclid at a very competitive cost to taxpayers.
- Our number of publications and impact will skyrocket in the coming years!

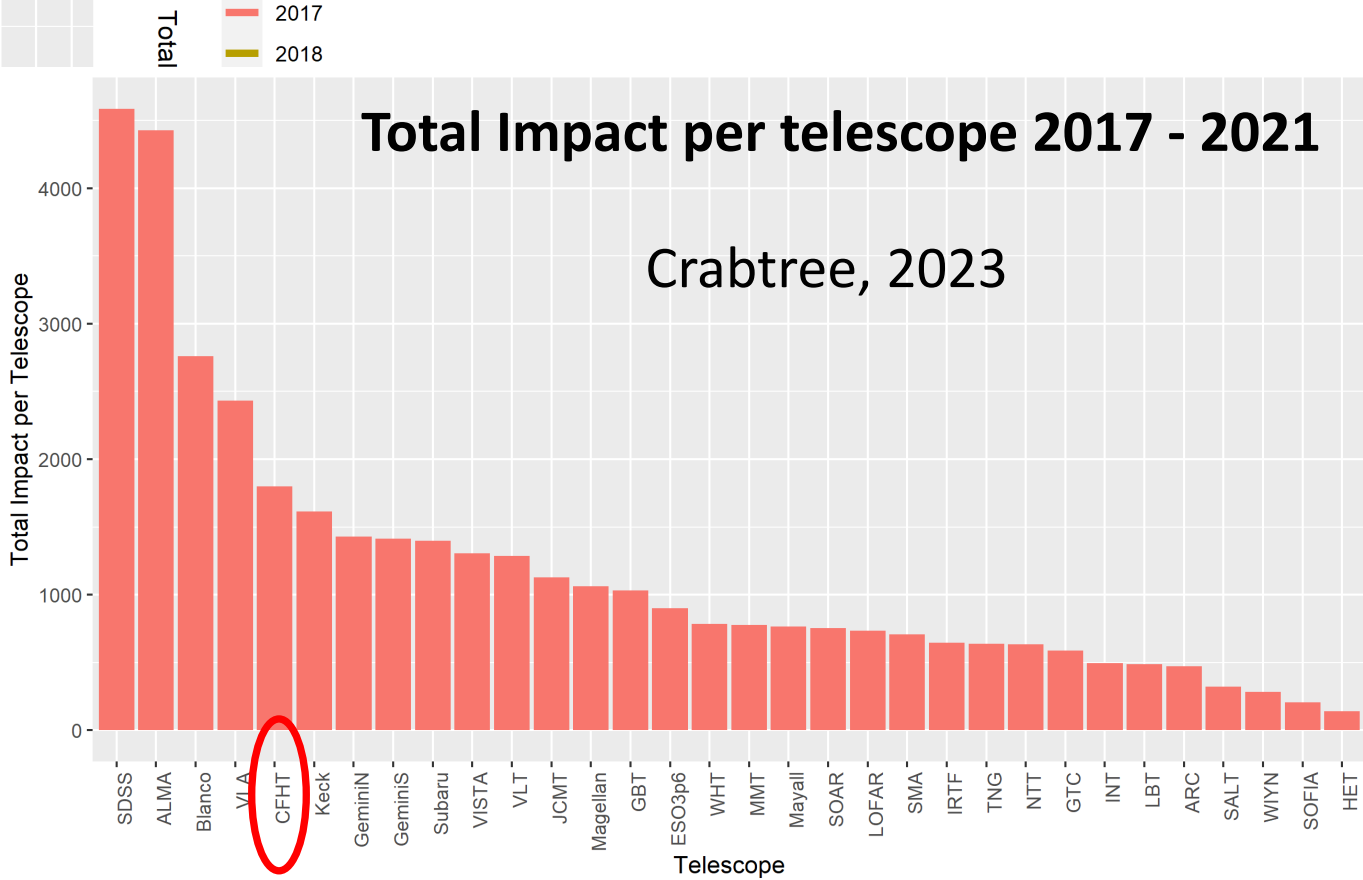


Euclid moving to L2 by CFHT-MegaCam / 12-07-2023

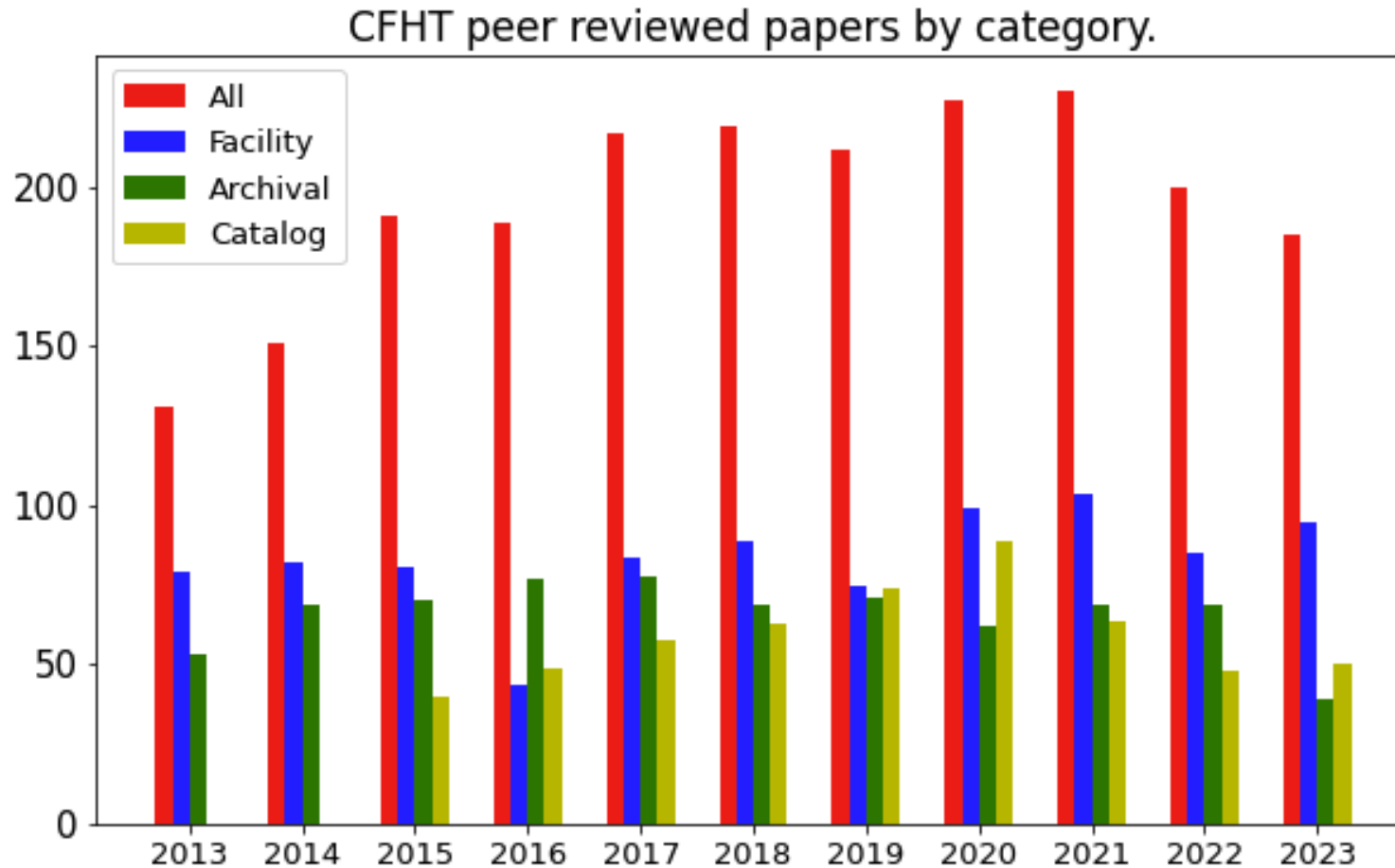
Publications and Impact



Analyses and plots Dennis Crabtree, HAA



Publications and Impact



- The publication record from archival data and catalogs is a testimony of the importance of providing high-level data products with a highly efficient archiving infrastructure.
- CFHT's data have been archived at CADC since 1992

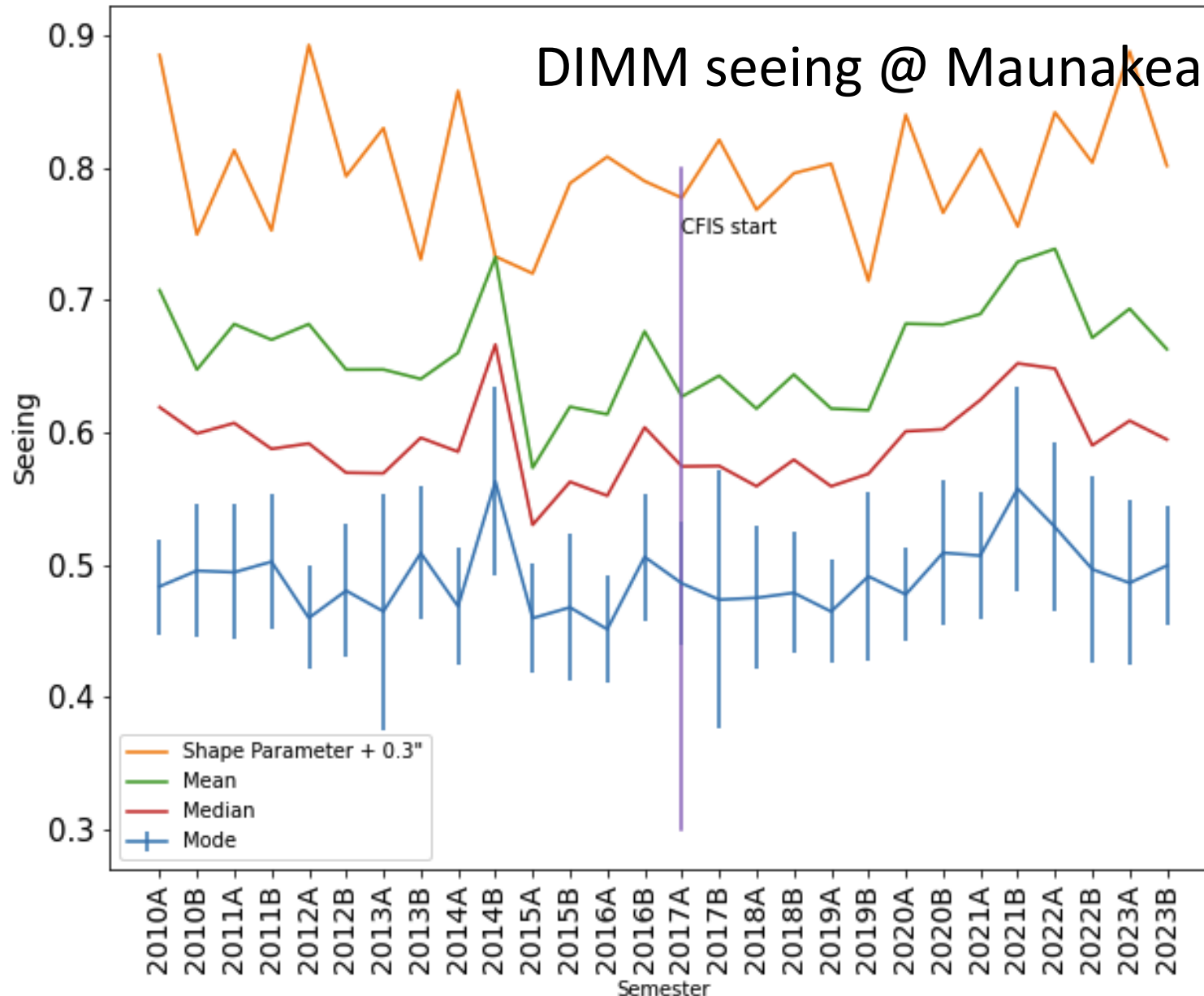
Publications : Impact of Legacy Surveys (LS) and Large Programs (LP) vs. PI programs



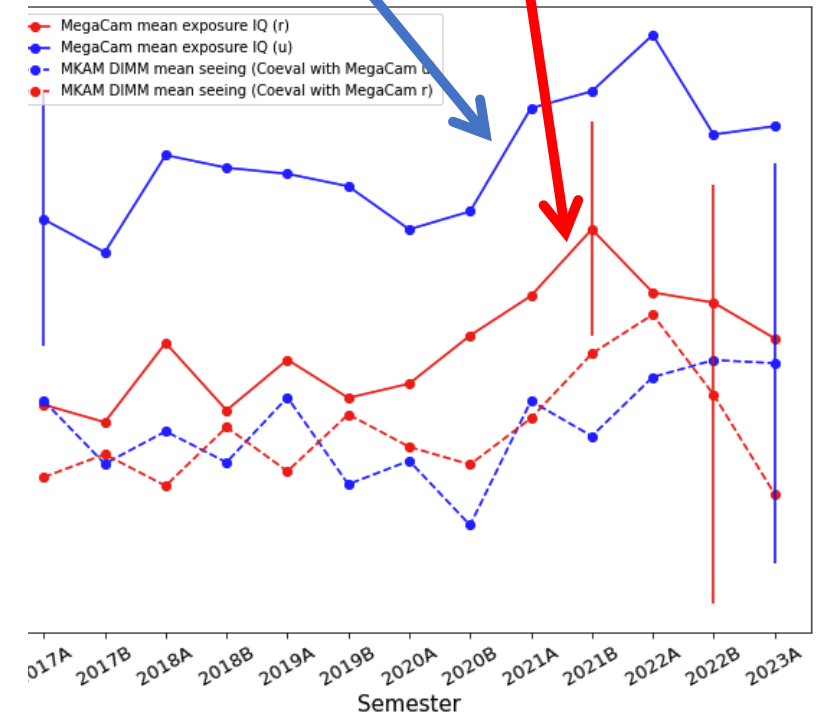
- CFHTLS : Legacy Survey carried out between 2003 and 2008. 450 nights
- Large Programs: 20 programs since 2008, between 30 and 300+ nights allocation per program, representing ~ 35% of the total telescope time.

	Number of Publications	Number of Nights	Publications per night
PI programs	3481	~42 years	0.30
LPs (excluding CFHT-LS, and recent / ongoing LPs)	918	1220	0.75
CFHT-LS	666	450	1.5

Decadal variations of seeing above Maunakea



MegaCam data in the **u** and **r** bands



Analysis and plots
Daniel Devost, CFHT

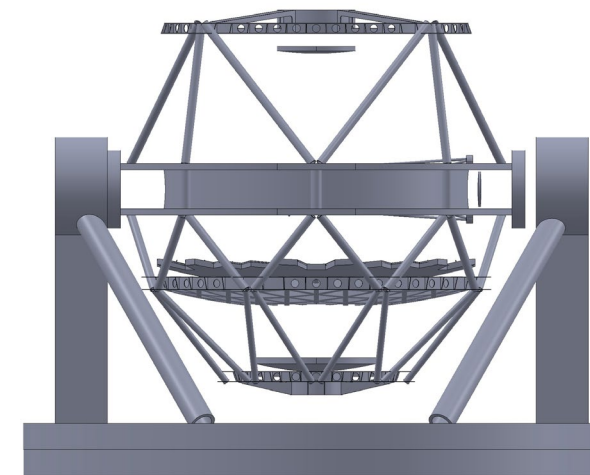
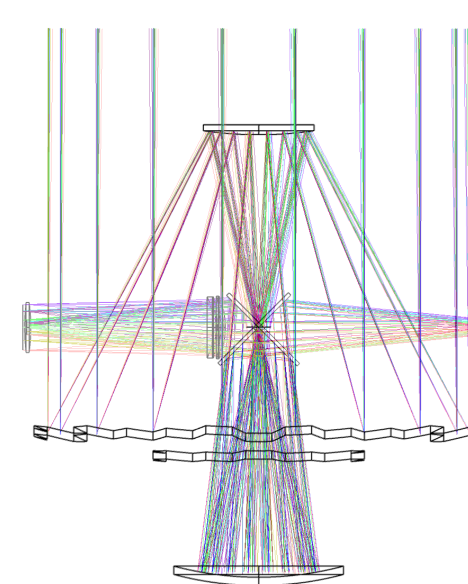
MSE status and context

<https://mse.cfht.hawaii.edu/>

- Phase A of the original design was completed in 2018, and a comprehensive science case was elaborated by a 400+ strong science team.
- Recognizing and respecting the situation and new process underway on Maunakea, construction of MSE will not begin until 2034+.
- A new design (Quad-Mirror - QM) is now being considered for a feasibility study phase.
 - 10-12 m diameter telescope
 - Nasmyth foci
 - 1.5 sq. degree field of view
 - Up to 20,000 fibres



Sam Barden



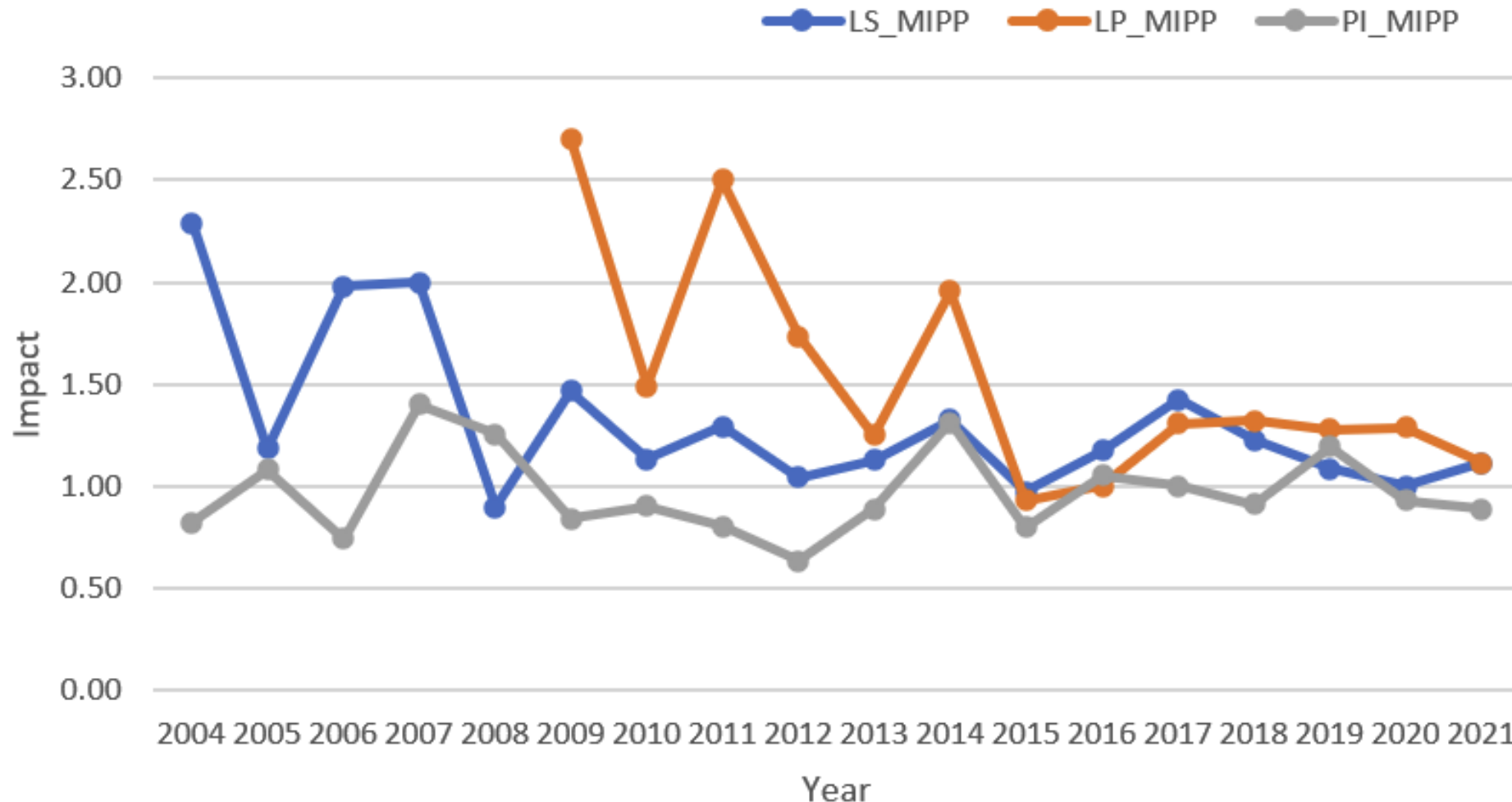
10-yr Outlook

- A 10+ yr plan of science operations with our workhorse instruments (MegaCam, ESPaDOnS and SPIRou)
- Possible development of an IFU
- Large Programs and Legacy Surveys
- Feasibility of the new MSE QM design and related R&D activities
- Possible start of MSE construction middle of next decade, contingent on renewal of the lease and local community consent.

BACKUP SLIDES

Publications : Impact of Legacy Surveys (LS) and Large Programs (LP) vs. PI programs

Median Impact per Paper (MIPP)



0 nights
1 nights

Publications
per night

0.30

0.75

1.5

- F
- C
- L
- a

LPs (€

Most common observatory codes for recoveries

