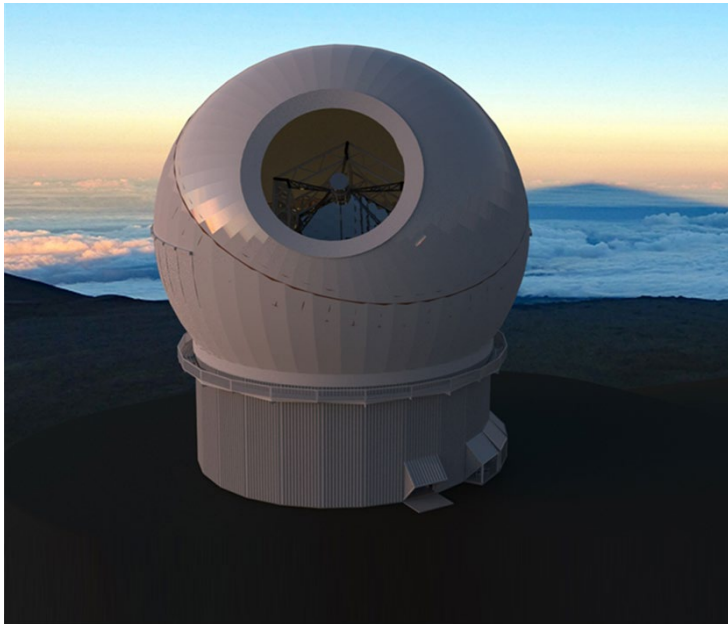


Canada-France-Hawai'i Telescope Upcoming Call for Letters of Intent

On behalf of the Scientific Advisory Committee and Board of Directors, the Canada-France-Hawai'i Telescope plans a mid-2023 call for Letters of Intent to collaborate on future development of CFHT with the design study of Maunakea Spectroscopic Explorer (MSE) and MSE-Pathfinder, a CFHT instrument which will be a precursor to MSE.

With the ability to collect millions of spectra over a large wavelength range and field of view, MSE will reveal the composition and dynamics of the faint Universe and impact nearly every field of astrophysics across spatial scales from individual stars to the largest scale structures in the universe. Science enabled by MSE will include the comprehensive follow-up of the Gaia and Rubin Observatory LSST stellar samples



down to limiting magnitudes of $g \sim 20-24$ mag to understand the chemistry and dynamics of the Milky Way and its neighboring satellites with unprecedented detail; the revolutionary study of galaxy formation and evolution with a stellar mass complete sample over billions of years back to "cosmic noon" ($z \sim 2.5$) when the Universe was at its peak of star formation; and the examination of a large volume of the Universe with a galaxy density sufficient to measure the extremely large-scale density fluctuations required to explore primordial non-Gaussianity (to approximately $\sigma(f_{NL}) \sim 1.8$) and consequently, inflation.

MSE-Pathfinder will include both Multi-Object Spectrograph (MOS) and Integral Field Unit (IFU) capabilities. It will have vigorous science programs that actively participate in the requisite spectroscopic follow-up of sources and transients identified by Rubin Observatory LSST, Euclid, and Roman, with a dedicated target-of-opportunity observational mode. Moreover, it will retire MSE's identified software and instrument risks.

Maunakea is an iconic mountain for the Native Hawaiian people, across Polynesia, and beyond. Its summit is home to hundreds of historic properties, including burial grounds and shrines. It is a sacred mountain of the highest significance to many Native Hawaiians, the place where Earth and Sky connect. Maunakea and Hawai'i Island are a constant source of inspiration for those privileged to live and work there. Astronomy on Maunakea is at a turning point. The current master lease and subleases for the observatory sites will expire at the end of 2033. A newly established organization, the Mauna Kea Stewardship and Oversight Authority (MKSOA), will assume full authority to manage the mountain in mid-2028. MKSOA, with strong, inclusive and balanced, Native Hawaiian representation, will decide the future of astronomy on Maunakea.

CFHT, its funding organizations, and its contributing partners support the values of community-based astronomy promoted in the Astro2020 report. We believe the future of astronomy on Maunakea requires a new model, one which fully involves the local and Native Hawaiian communities in the governance of the mountain and in the definition of new projects at their inception. Together with the Hawai'i Island community and MKSOA, we will define key measurable goals for future CFHT development in terms of local employment, governance, and sustainability as integral part of the MSE-Design Study and MSE-Pathfinder development, along with the method to ensure accountability for meeting those goals.

With our planned call for Letters of Intent, we are looking for partners at the institutional or national level who are interested in one or both components and in the future of CFHT:

1. MSE-Design Study of MSE, a massively multiplexed spectroscopic facility that would be installed on Maunakea if approved by the new MKSOA. Based on the approval process and anticipated funding opportunities, the expected timeline places the start of MSE construction in the early 2030s, leading to science operations beginning in the early 2040s. One of the three MSE-Design Study concepts is a 12-m class facility with up to ~20,000 fibers operating from optical through near-infrared wavelength with medium to high spectral resolution. We are soliciting the community to contribute scientific and technical expertise and/or funding to the MSE-Design Study. The goal is to advance the facility design and deliver a construction proposal before the end of the decade. The construction proposal will incorporate a strong community engagement component created in collaboration with the Hawaiian community.

2. Development of MSE-Pathfinder, a precursor instrument for CFHT. This instrument will consist of both IFU and MOS capabilities, and its development will be led by CFHT with partner institutions. In the envisaged operational model, approximately 80% of the time would be used for large survey programs and 20% for PI programs. The baseline IFU concept calls for a large-format 1000 fiber unit operating in optical wavelength at moderate spectral resolution with high spatial sampling. The baseline MOS concept includes 1000 fiber positioners that will acquire spectral data in optical wavelength at moderate resolution. DESI-like spectrographs will be fed optically by the IFU or by MOS. Ultimately, partner institutions will define the final technical specifications (e.g., potential extensions of capabilities are NIR regime and/or high spectral resolution). The expected development schedule for the IFU component will be 4-5 years and the MOS component will be available 1-2 years afterward. Contributing partners will participate in commissioning and receive Guaranteed Time Observations (GTO) during science operations. The call for Letters of Intent will contain further details on GTO.

To learn more about the upcoming call, please contact:

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