Maunakea Spectroscopic Explorer

MSE Project Status

The MSE partnership in 2018 consists of Canada, France, Hawaii, Australia, China and India. The Detailed Science Case and the Science Requirements Document were written by the international Science Team in 2014 – 2015.

The Conceptual Design Phase ran from 2015 – 2017, during which designs were developed for all major sub-systems. This Phase culminated in January 2018 with a system-level review. A fully external panel (Chair: Michael Strauss, Princeton) examined all documents that together describe the Observatory System that enables the science described in the Detailed Science Case.

Preliminary Design Phase is scheduled to last for 2 years, and will run parallel to outreach and permitting activities. Once these steps are successfully completed, MSE will enter construction: a technically driven schedule demonstrates that construction will take 6 years. MSE is cost-capped at USD300M.

Maunakea Spectroscopic Explorer

For more information on the status of MSE, and to get your community involved in its ongoing development, please contact:

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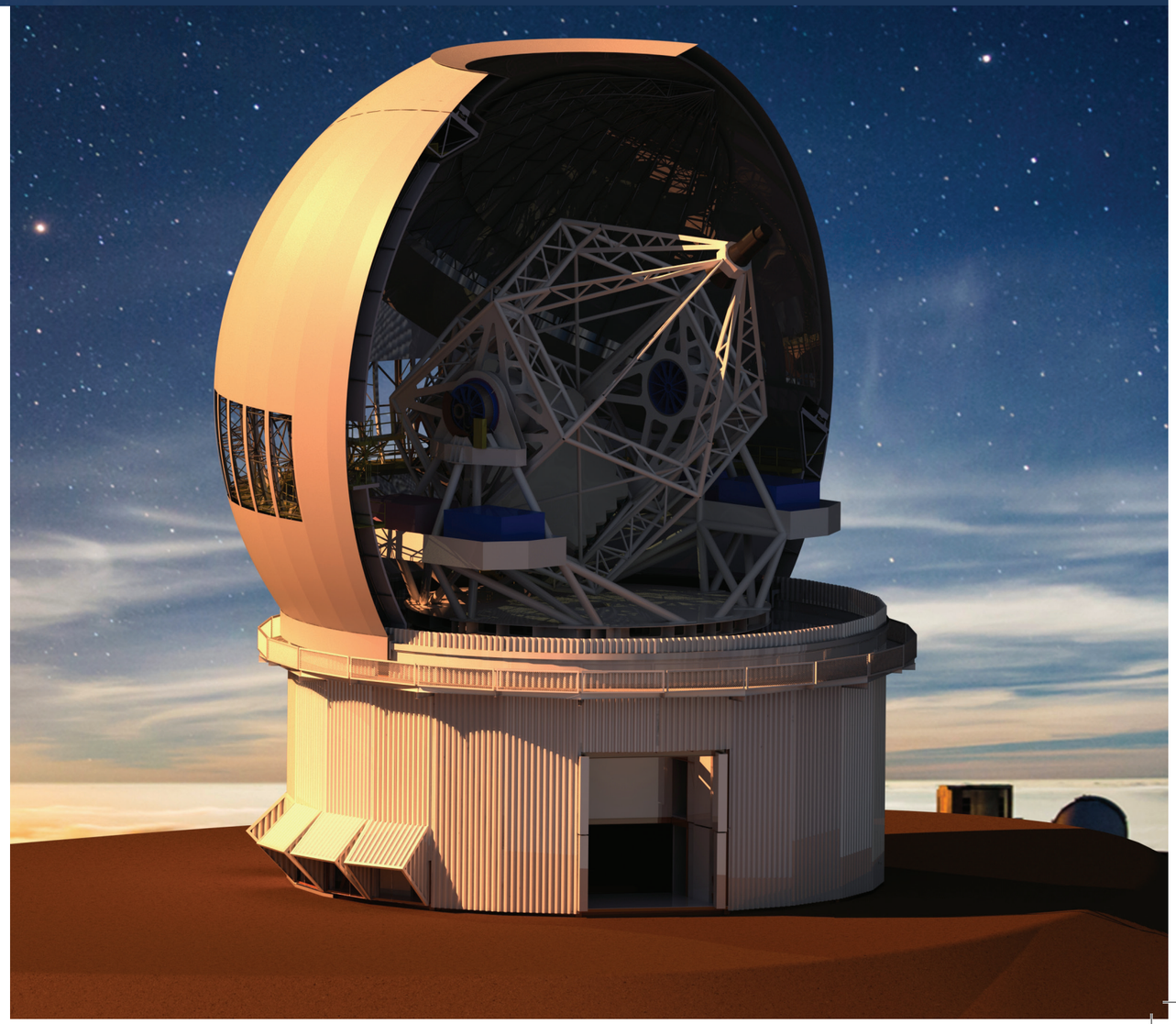
Detailed Science Case:
https://arxiv.org/abs/1606.00043

URL: http://mse.cfht.hawaii.edu



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What is MSE?

MSE is the realization of the long-held ambition of the international astronomy community for highly multiplexed, large aperture, optical and near-infrared spectroscopy on a dedicated facility. From the outset, MSE is designed as the ultimate spectroscopic survey machine.

MSE is a refurbishment of the CFHT, upgraded to a larger aperture and with an expanded partnership. MSE is situated at one of the highest quality sites for optical astronomy on the planet. From its equatorial location, it can observe more than three quarters of the entire sky.

photo: CFHT/Coelum

The driving science for MSE has never been more compelling:

The Dark Matter Observatory: MSE will be the ultimate facility to measure the dynamics of dark matter halos from dwarf-to-cluster scales, obtaining complete samples of millions of tracer particles over the entire extent of the halo.

- **The growth of supermassive black holes:** MSE will measure the masses of thousands of supermassive black holes and trace their growth with redshift via a time-resolved reverberation mapping program.
- **The chemical evolution of the Galaxy:** MSE will be the ultimate Gaia follow-up mission, and will be the only dedicated facility to obtain detailed chemical abundances for millions of stars across the full luminosity range of Gaia targets.
- **Galaxy formation across cosmic noon:** MSE will perform the equivalent of a SDSS Legacy Survey in 7 redshift bins out to beyond the peak of the star formation history of the Universe. A key science driver is to link the formation and evolution of galaxies to the large scale structure of the Universe.

MSE will occupy a unique and critical role in the emerging network of astronomical facilities active in the 2020s. It will become an essential follow-up facility to current and next generations of multi-wavelength imaging surveys, including LSST, Gaia, Euclid, WFIRST, the SKA and ngVLA.

Defining science capabilities of MSE include:

- **Survey speed and sensitivity:** With a large aperture (11.25m) and wide field of view (1.5 square degree), MSE will enable large surveys of the faintest science targets.
- **Spectral performance and multiplexing:** In a single exposure, MSE will obtain over 3000 spectra at a spectral resolution of R= 3000 in the optical through to H-band). Simultaneously, it will obtain over 1000 optical spectra at R= 40,000.
- **Dedicated and specialized operations:** As a dedicated facility, MSE is designed to be well-calibrated and very stable, enable a vast range of new science.

A Project Forged from Decades of Experience in Hawaii

MSE will benefit from CFHT's 40 years of experience on Maunakea and a support staff deeply rooted in the Hawaii Island community. CFHT actively engages the Big Island community by working with local schools, community groups, workforce development programs and hosting numerous outreach events and activities. MSE is committed to balancing cultural and environmental considerations in the design of the observatory and the organization of the new partnership.