



THE UNIVERSITY OF ARIZONA  
COLLEGE OF SCIENCE  
Astronomy  
& Steward Observatory



Smithsonian Astrophysical Observatory

MÉXICO  
GOBIERNO DE LA REPÚBLICA



CONACYT  
45 años

AEM  
AGENCIA ESPACIAL  
MEXICANA



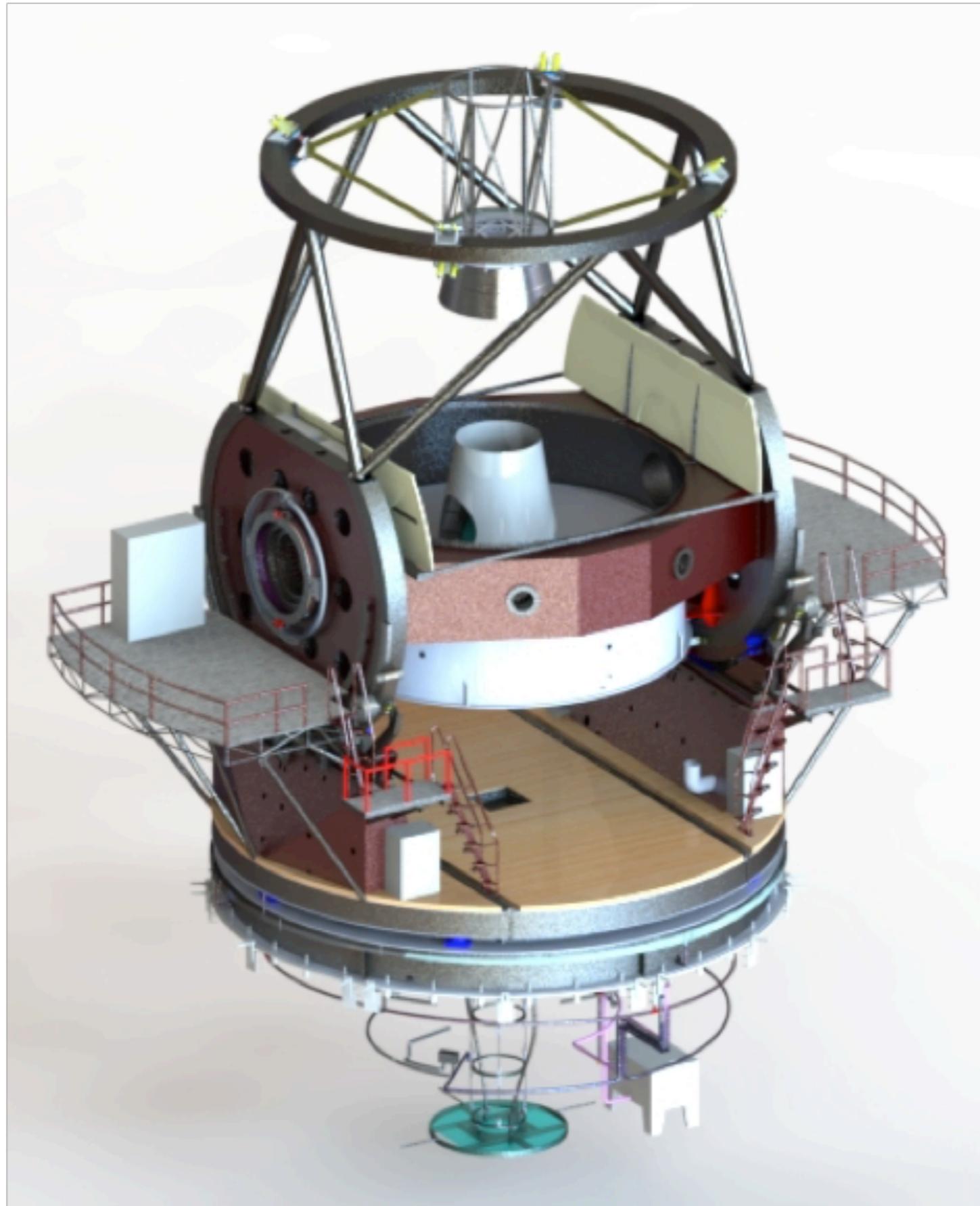
# TSPM: Project overview and organization

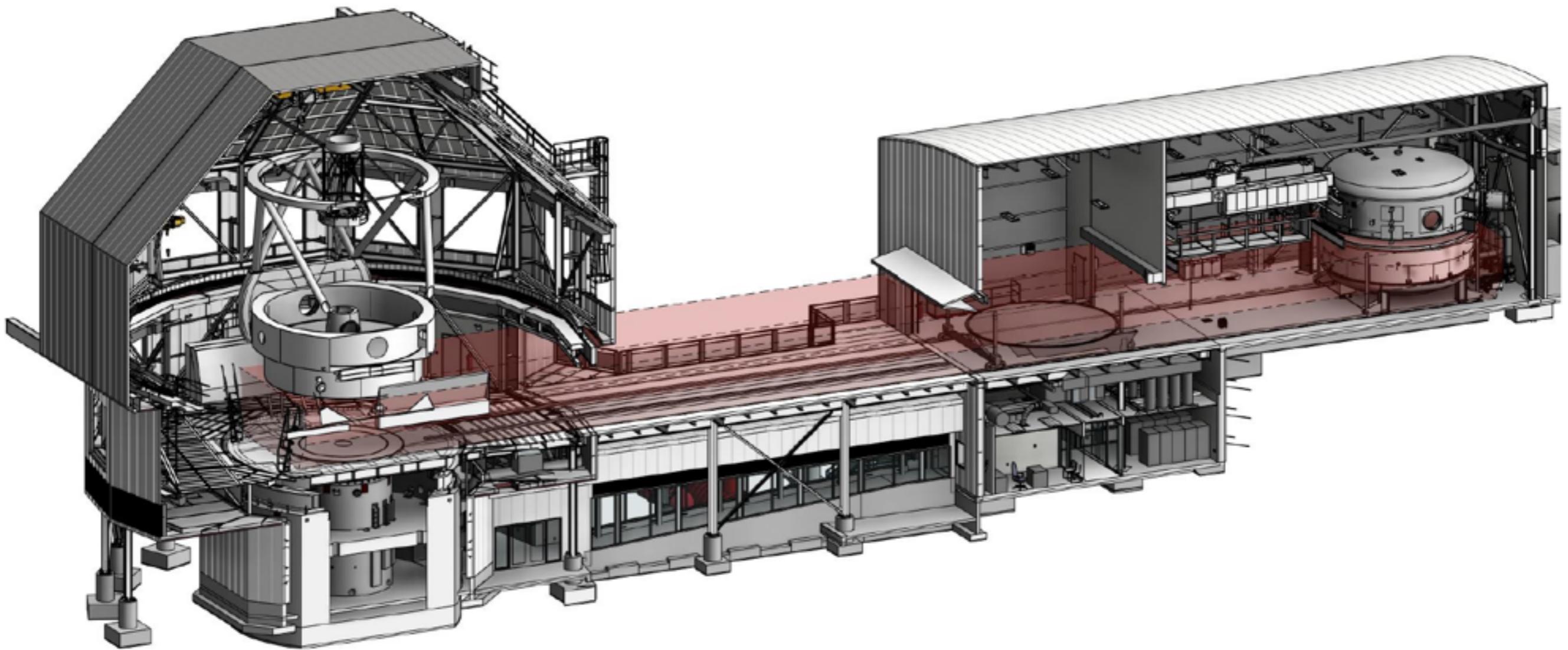
William Lee (Instituto de Astronomía, UNAM)

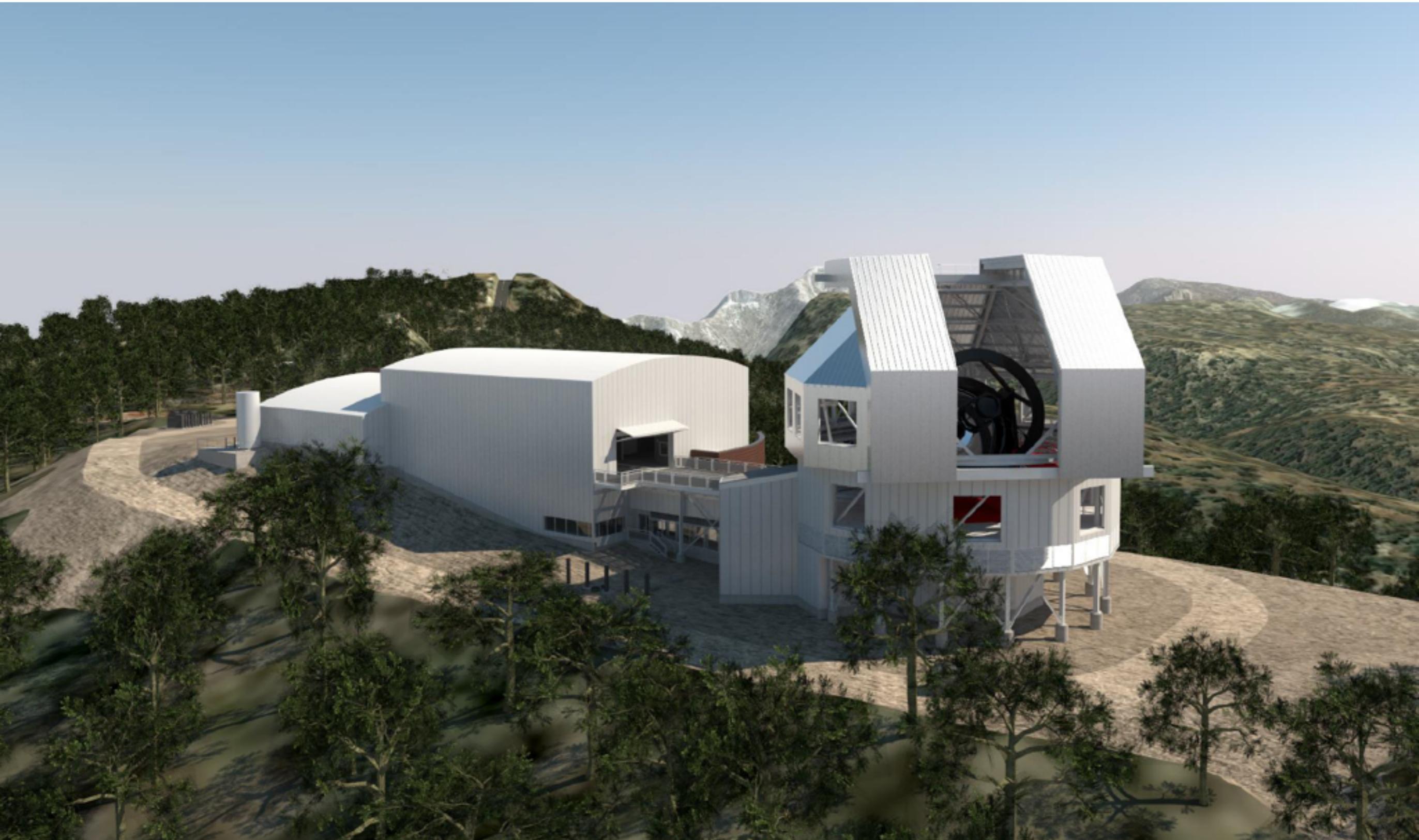
[wlee@astro.unam.mx](mailto:wlee@astro.unam.mx)



© Stéphane Guisard







# Origins

- Agreement between UA and INAOE for the casting of a MI for a telescope in Mexico
- Letter of Intent between UNAM/INAOE/UA/SAO in 2012 in order to explore the possibility of collaborating on a 6.5m wide-field telescope at SPM
- Plan to optimize infrastructure at MMT and profit from available experience and equipment
- Group has proceeded with feasibility and design work since 2013
- Broad objective is to develop TSPM and to operate the TSPM jointly with the MMT as a bi-national astrophysics laboratory
- Intent to develop TSPM, where appropriate and possible, in Mexico and by groups, companies and institutions from Mexico.
- Community-wide interest in Mexico in the project: science workshops and presentations, exercises in relevant long-term planning for astronomy (2012), close relationship with CONACyT for the development of astronomy.
- OAN-SPM is a National Laboratory under CONACyT's corresponding call for the renewal and upgrade of infrastructure since 2010.

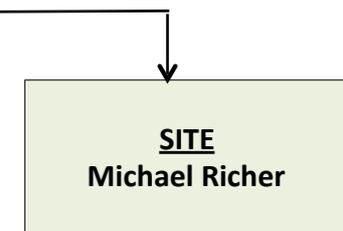
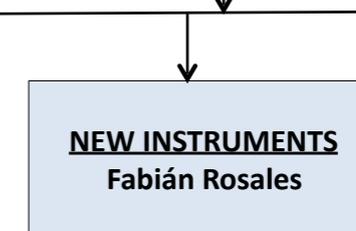
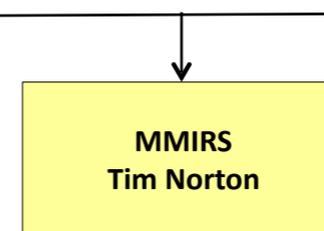
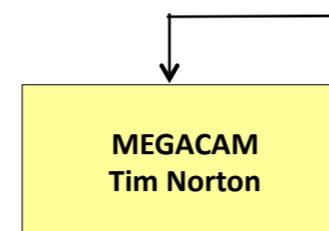
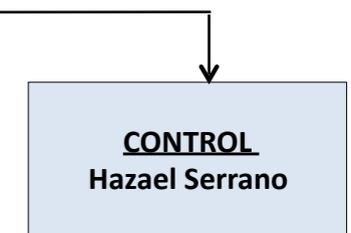
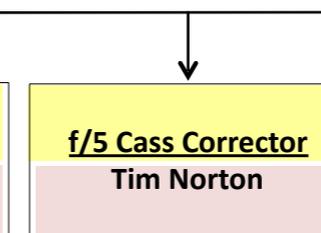
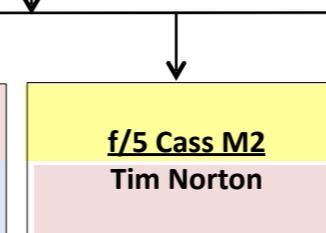
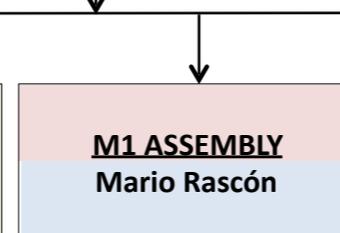
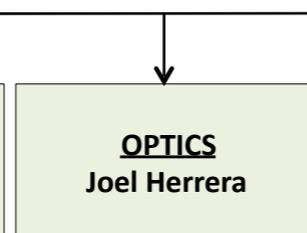
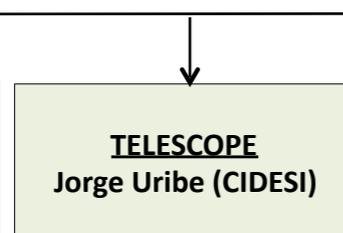
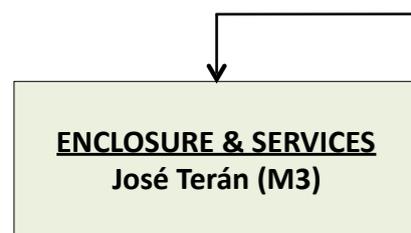
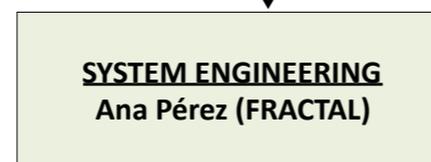
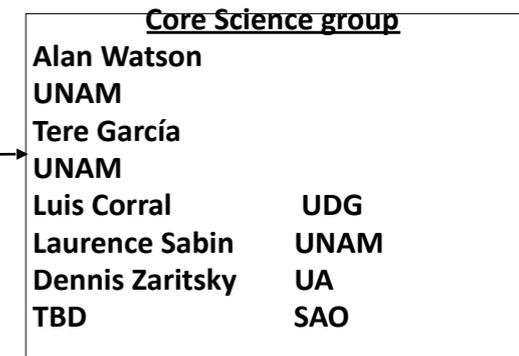
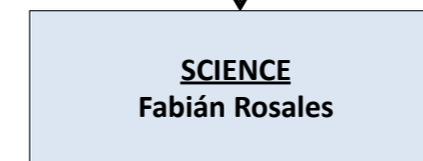
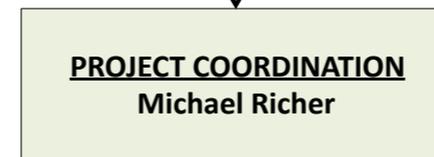
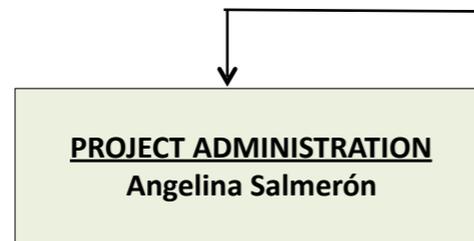
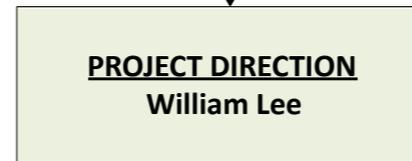
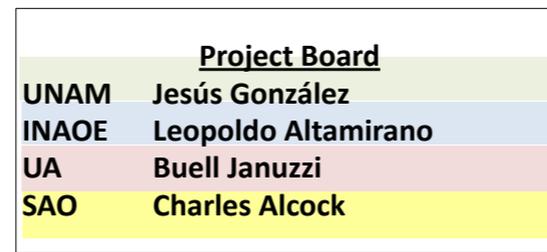
# Academic partnership and consortium

- Mexico
  - ~240 astronomers in Mexico
  - UNAM charged with Observatorio Astronómico Nacional (OAN) since 1929
  - UNAM maintains and develops OAN- in San Pedro Mártir, B.C. since late 60s/early 70s. Run as a service facility for all astronomers in Mexico regardless of their affiliation
  - UNAM and INAOE are the two largest institutions for research in astronomy in Mexico, with ~half of all full-time astronomers in the country
- US
  - long standing collaborative relationship between Mexico and UA and SAO
  - UA and SAO jointly developed and operate MMT at Mt. Hopkins
  - UA and INAOE jointly collaborated in the fabrication of a MI for SPM
  - other projects between existing partners as precedent (e.g. Harold Johnson Telescope, TAOS-II)

# Partner contributions

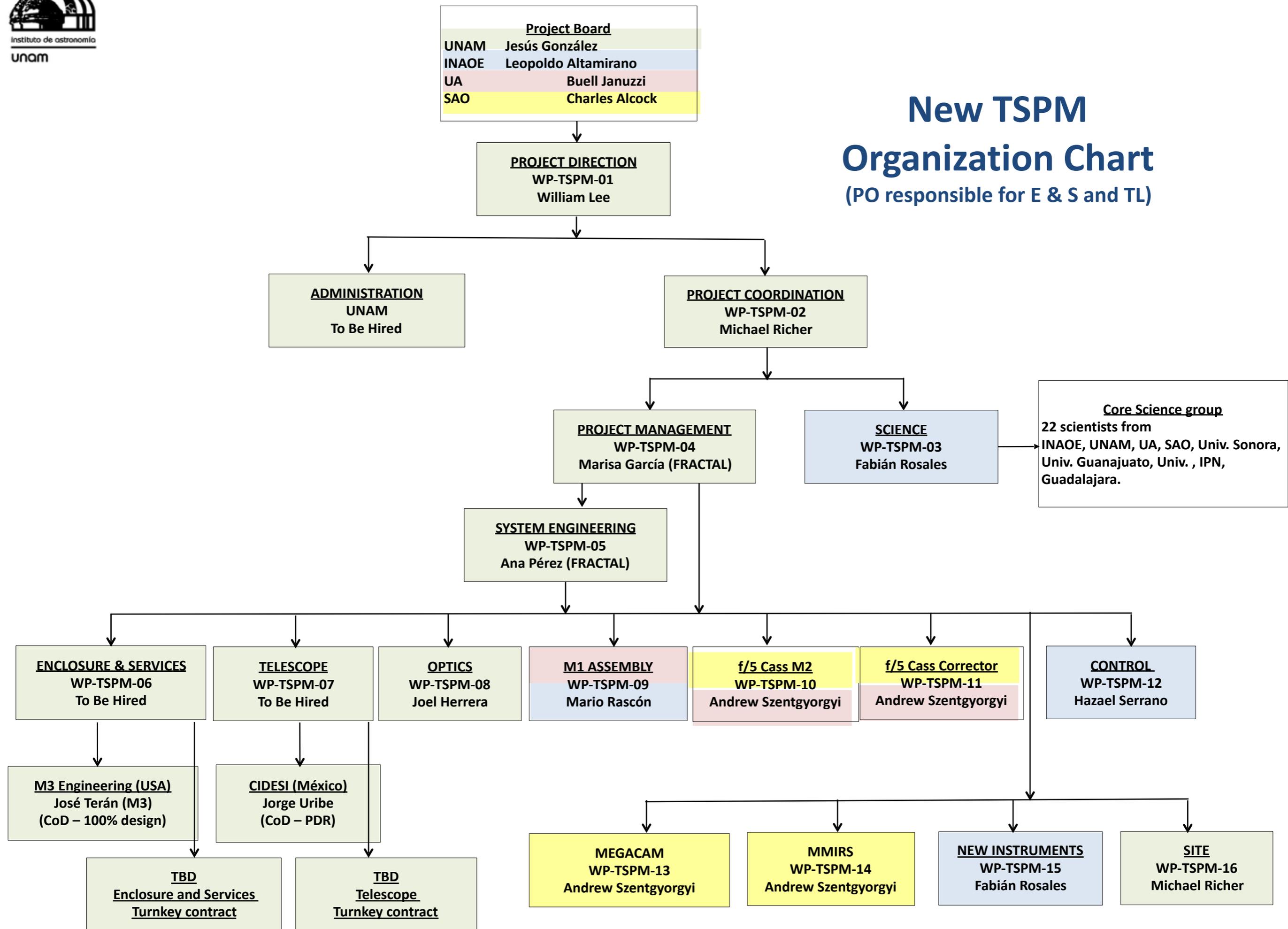
- Site: UNAM (SPM)
- Primary mirror system: UA/INAOE
- f/5 secondary, wide-field corrector and f/5 instruments for Cassegrain station in use or development at MMT and/or Magellan: UA/SAO
- Project Management, Systems Engineering: Mexico
- Telescope structure and control system: Mexico
- Enclosure and services: Mexico
- Post-day one optics and Nasmyth configurations: Mexico
- MMT and its instrumentation: UA/SAO

# TSPM Organization Chart (2016 – 2017)



# New TSPM Organization Chart

(PO responsible for E & S and TL)



# Complementarity

- TSPM is intended to operate in Mexico in the context of complementary infrastructure for astronomy within the country or available to it through other projects/partnerships
- Collaborating with MMT to optimize the execution of science programs with different requirements
- General O/IR facilities at OAN-SPM
- Gran Telescopio Milimétrico Alfonso Serrano (INAOE/UMass) at Sierra Negra
- High Altitude Water Cherenkov (HAWC) observatory at Sierra Negra, a Mexico/US project led by UNAM and INAOE, and U of Maryland and LANL
- Mexican participation in the Sloan Digital Sky Survey (SDSSIV)
- Mexican partnership in the Gran Telescopio Canarias (GTC)
- The available facilities and partnerships provide multi-wavelength, imaging and spectroscopic capabilities for transient and wide field follow-up

# Funding

- Design work has been funded, and is being funded, primarily by CONACyT through specific yearly proposals, with additional contributions by UNAM, and in-kind (human resources) contributions from UNAM, INAOE, UA and SAO.
- Currently the funding for construction has been estimated according to design, and presented to CONACyT and UNAM.
- Partial funding for the beginning of construction can be provided by CONACyT and UNAM.
- The entire amount required for construction according to the project schedule is currently not secured.

# MoU

- To further formalize the Lol, a draft MoU has been circulated among the partners (UNAM, INAOE, UA, SAO)
- The overall structure of the partnership has been agreed to.
- The final details of the contributions and rights and responsibilities remain to be detailed.
- Among these are the computation of equivalent telescope time for in-kind contributions, the particular sequence of installation of contributed instrumentation and the specific conditions under which certain instruments may be delivered to TSPM.
- We expect to formalize the MoU in 2017.

# Project structure for construction

- A draft MoU between UNAM and Fundación UNAM has been agreed to and we expect to sign it before the end of 2017.
- The current structure of the project for the design phase has been distributed out of UNAM by subcontracting (M3, FRACTAL, SENER, Dynavac) and collaborative agreements (INAOE, CIDESI, UA, SAO).
- This is not the structure that would be in effect for construction.
- We expect to formalize a project structure for construction under a different legal entity with its own identity, likely a Mexican “Asociación Civil” with independent authority for hiring personnel and subcontracting.
- Installing the PO under the existing structure of Fundación UNAM, which is a constituted “Asociación Civil” has been given preliminary authorization.

# SPM integral development

- OAN-SPM is within a National Park
- The legal standing of Observatory within Park assured through agreement with National parks Commission dependent on Ministry of the Environment.
- Access road fully paved since 2009.
- Light pollution prevention legislation since 2006.
- Electrical power and fiber optic line under construction, scheduled for completion in 2019 (1MW and at least 100Mb/s).
- Significant upgrades to service infrastructure and scientific facilities since 2010 with important support from CONACyT.
- On-going projects for the installation of new telescopes in collaboration with Spain (installed), Taiwan (in commissioning), France (in design/under construction), US (in commissioning) and internally at UNAM (operating).
- The new infrastructure is complementary in science goals and is aligned with the strengthening of SPM as an international observatory.

# Beyond astronomy

- In addition to performing first rate astronomical research and furthering the growth of the astronomical community in Mexico, the TSPM project aims to contribute in:
  - development of human resources in Mexico,
  - furthering the growth of innovation and technological capabilities in Mexico and the relation between the academic and industrial sectors,
  - collaborative, international academic partnerships in science and technology,
  - protecting and responsibly developing the site of OAN-SPM,
  - regional impact in the economy and growth of Baja California,
  - bi-national collaboration with the US.

# Where we are now

- Feasibility studies in 2013.
- Work started with M3 and CIDESI in 2014.
- Community-wide workshops and presentations to CONACyT since 2013.
- Conceptual Design in 2015.
- PM and SE in the project since end of 2015.
- Geotechnical studies carried out in 2015/2016.
- Preliminary Design Review for Enclosure and Facilities in October 2016.
- Optics Progress Review and Telescope Preliminary Design Review today.
- Critical Design Review for Enclosure and Facilities next week.
- Environmental impact statement documentation ready for submission in Nov. 2017.

# Where we are going

- Pending availability of funds, the plan for 2018 is
  - Begin site work at SPM,
  - Plan for PD of Control Systems and Instruments Progress Review a year from now,
  - Call for Tender for Enclosure and Services and Telescope turnkey contracts to be in place a year from now.



Thank you

