



# Contribution of Hvar Observatory to the Rubin Observatroy/LSST

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Plitvička jezera  
Hybrid meeting  
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# Agenda

- Who we are: Hvar Observatory
- What we do: solar & stellar physics
- Our experience with ALMA
- Our planned contribution to Rubin / LSST



# Hvar Observatory



- founded in 1972 in cooperation with Ondrejov Observatory (Prague) of the CAS
- the leading national solar and stellar research institute, with solar and stellar telescopes, presently group of 10 astronomers
- offices at the Faculty of Geodesy in Zagreb, telescopes at the island of Hvar
- main research topics: solar, heliospheric and stellar physics, space weather
- a large network of international cooperation and projects

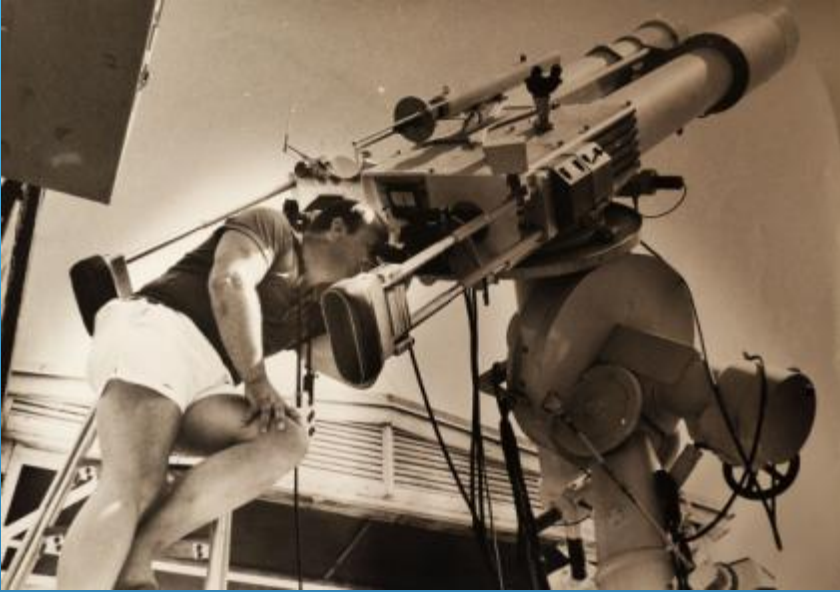






# Double solar telescope at Hvar

photographic films



- photosphere and chromosphere
- installed in 1972
- in 1997 photography → video system
- in 2004 video system → 1Mpix CCD cameras

1997 video system



# Double solar telescope at Hvar



- modernization: in 2010 4th imaging system was installed: 4MPix Pulnix TM-4200GE 12-bit CCD cameras
- high resolution images of active regions, flares and prominences on the Sun
- close cooperation with University of Graz, Austria and its Kanzelhöhe Solar Observatory



new imaging system from 2010



control room

- comprehensive data archive at Faculty of Geodesy in digital form

# Hvar 65-cm stellar telescope

- installed in 1972
- mirror of 650 mm, Cassegrain telescope
- focal ratio  $f/11.2$
- photometry of Be and eclipsing variable stars
- Hvar-Ondrejov photometric archive, UBV $\bar{R}$  Johnson system
- > 100,000 photometric measurements



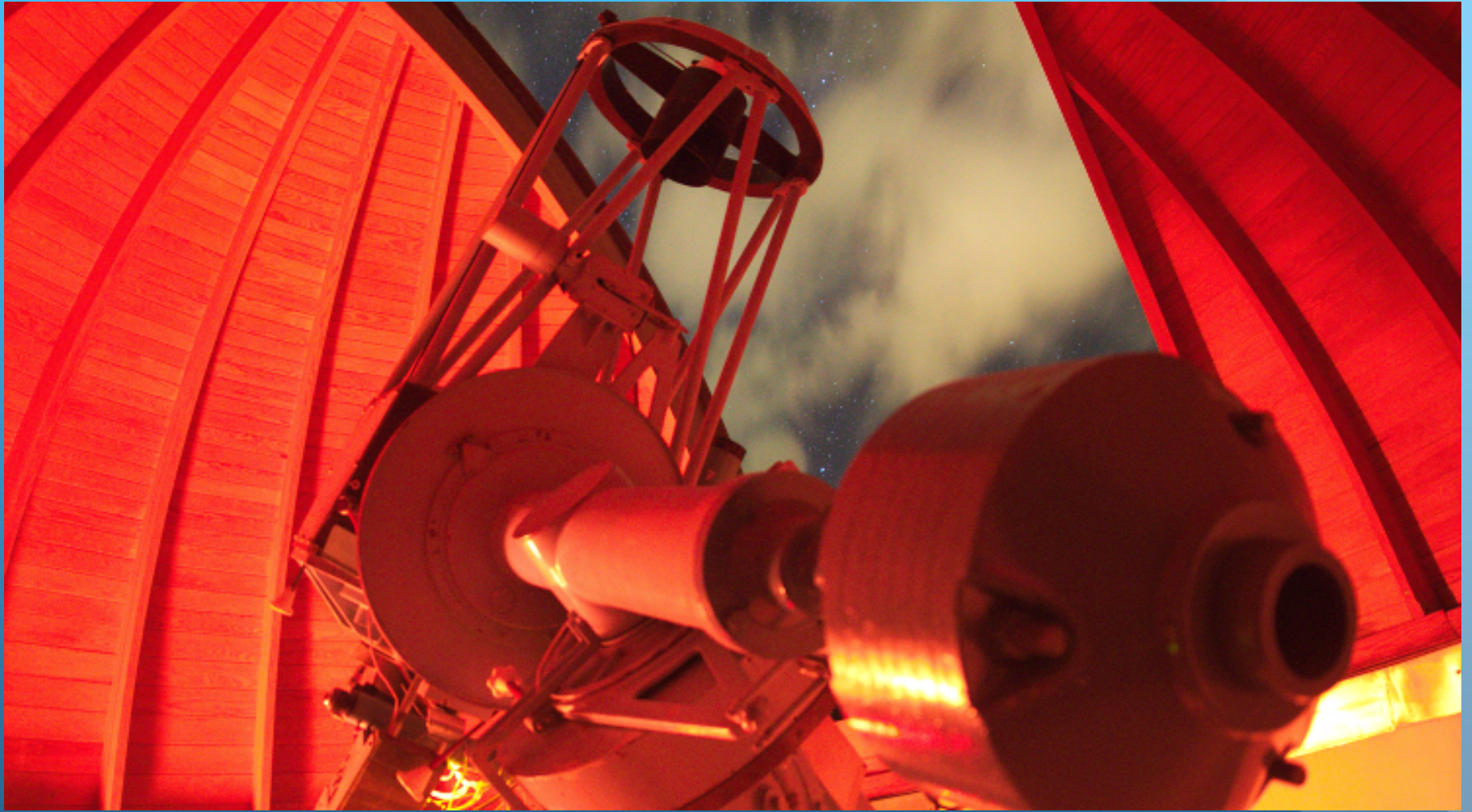


# Dome of the Hvar 65-cm stellar telescope



# Hvar 65-cm stellar telescope









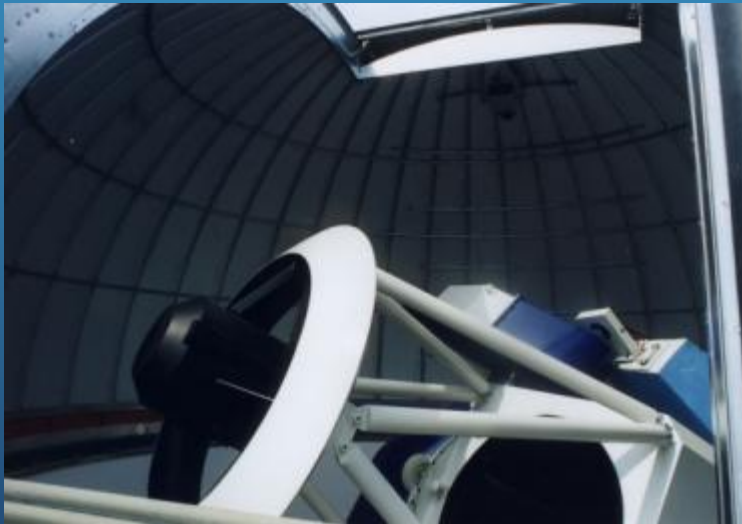




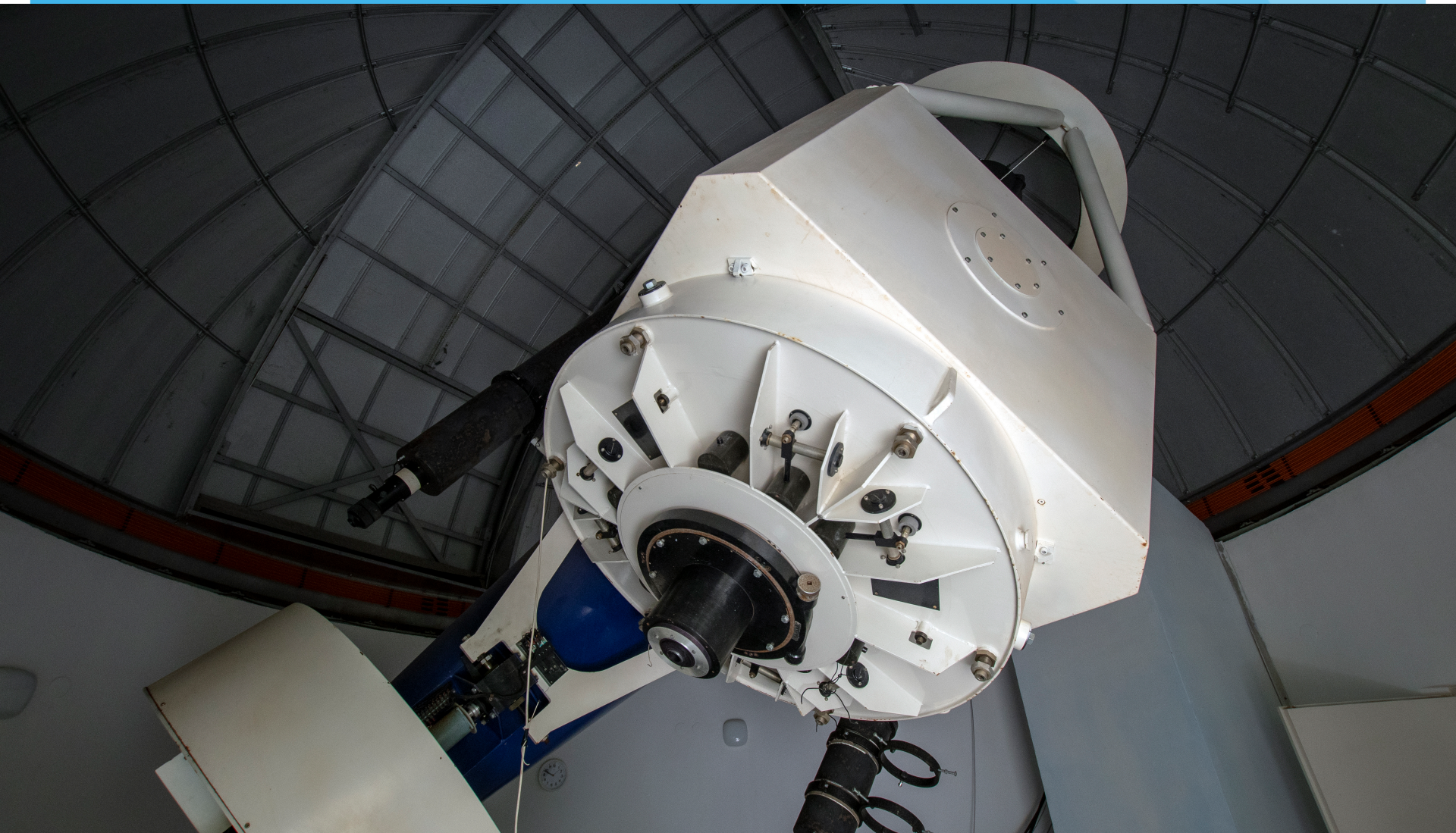


# 1-m Austrian-Croatian Telescope (ACT)

- installed in 1997
- primary mirror 1060 mm u Ritchey-Chretien telescope
- two secondary mirrors 400 mm (f/6.8) and 260 mm (f/15)
- English mounting, computer controlled telescope guiding
- equipped with CCD camera





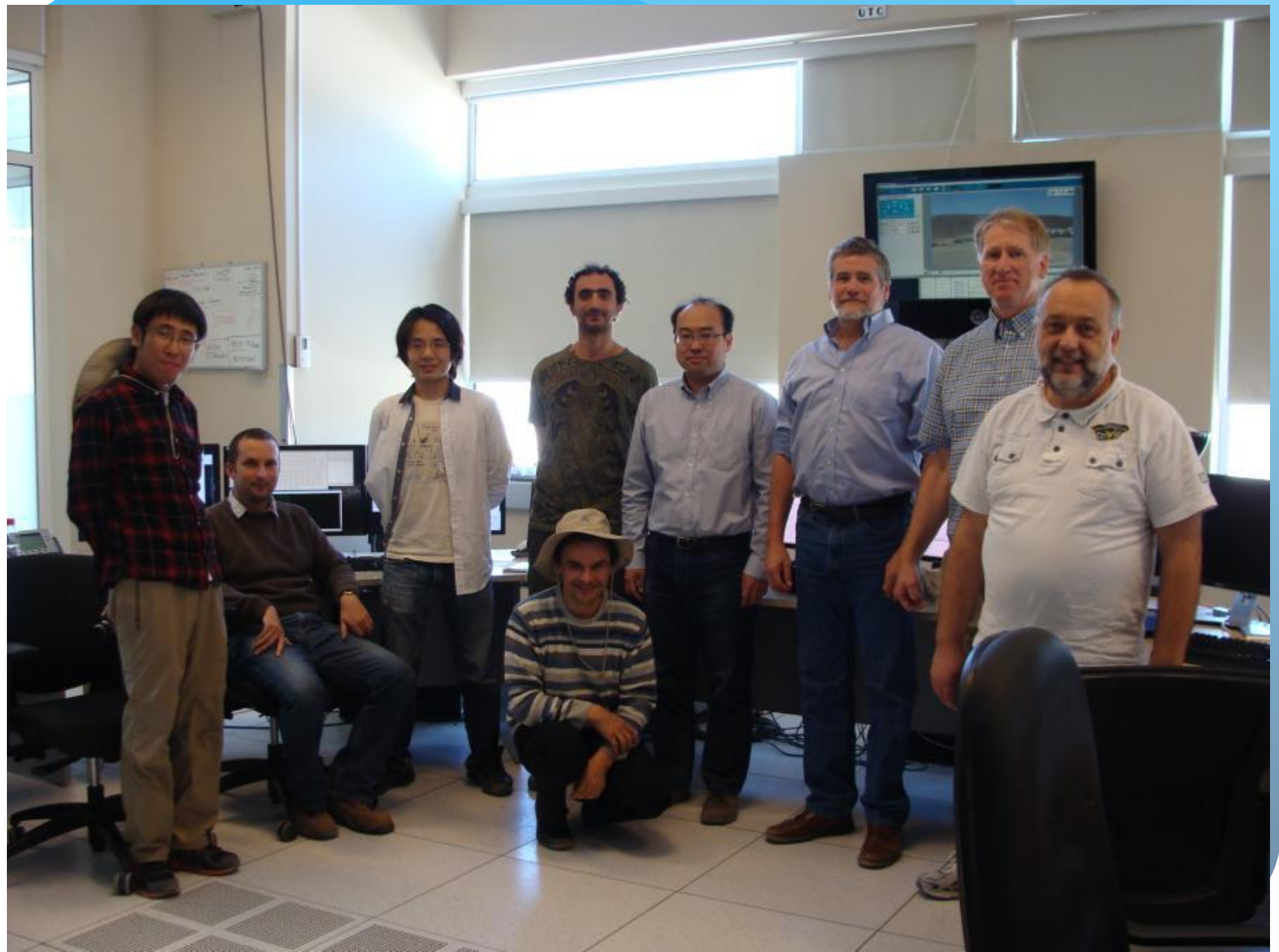


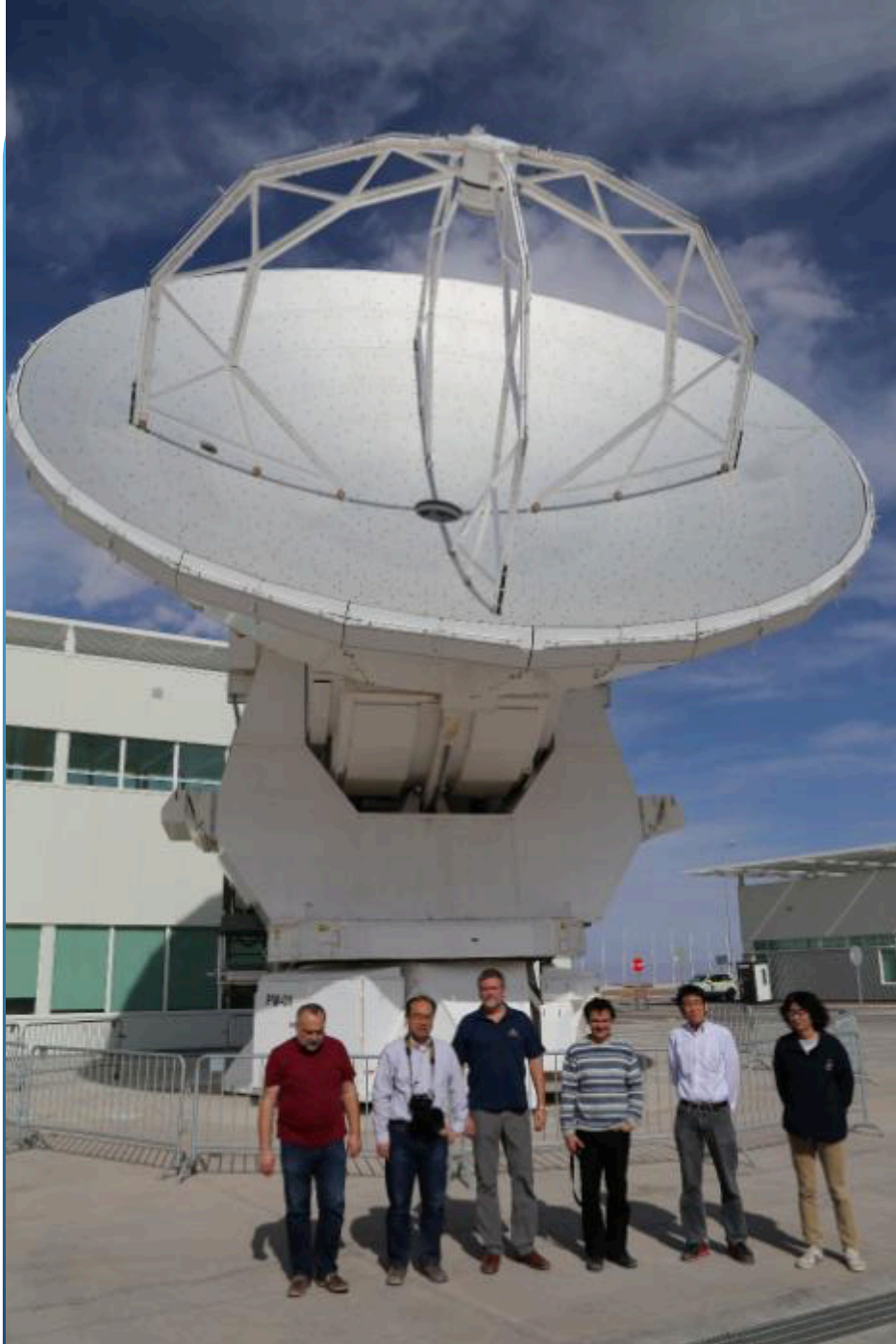
# ALMA

- **Atacama Large mm/sub-mm Array**
- **Solar Development Plan Study, 2014-2017, ESO**
- **development of ALMA solar observing modes and pipeline software scripts; CSV; data release; first results, etc.**









## ALMA Antenna at OSF

$d = 12 \text{ m}$

$h \approx 3000 \text{ m}$

AOS,  $h \approx 5000 \text{ m}$



# Planned contribution of Hvar Obs. to the Rubin/LSST Obs.

- expertise in classification of light curves and stellar photometry
- analysis of time series data, transients, variable stars, solar system objects
- software development for the LSST pipeline
- access to the extensive Hvar photometric archive
- 3-4 senior researchers, 10% FTE each, and
- a new proposal to the Croatian Science Foundation (stellar physics, 1 postdoc and 1 PhD student), to be submitted

# Acknowledgements

- This work has been supported by the Croatian Science Foundation under the project 7549 "Millimeter and submillimeter observations of the solar chromosphere with ALMA".