Haystack 37m–Telescope: Towards a Science and Operations Plan

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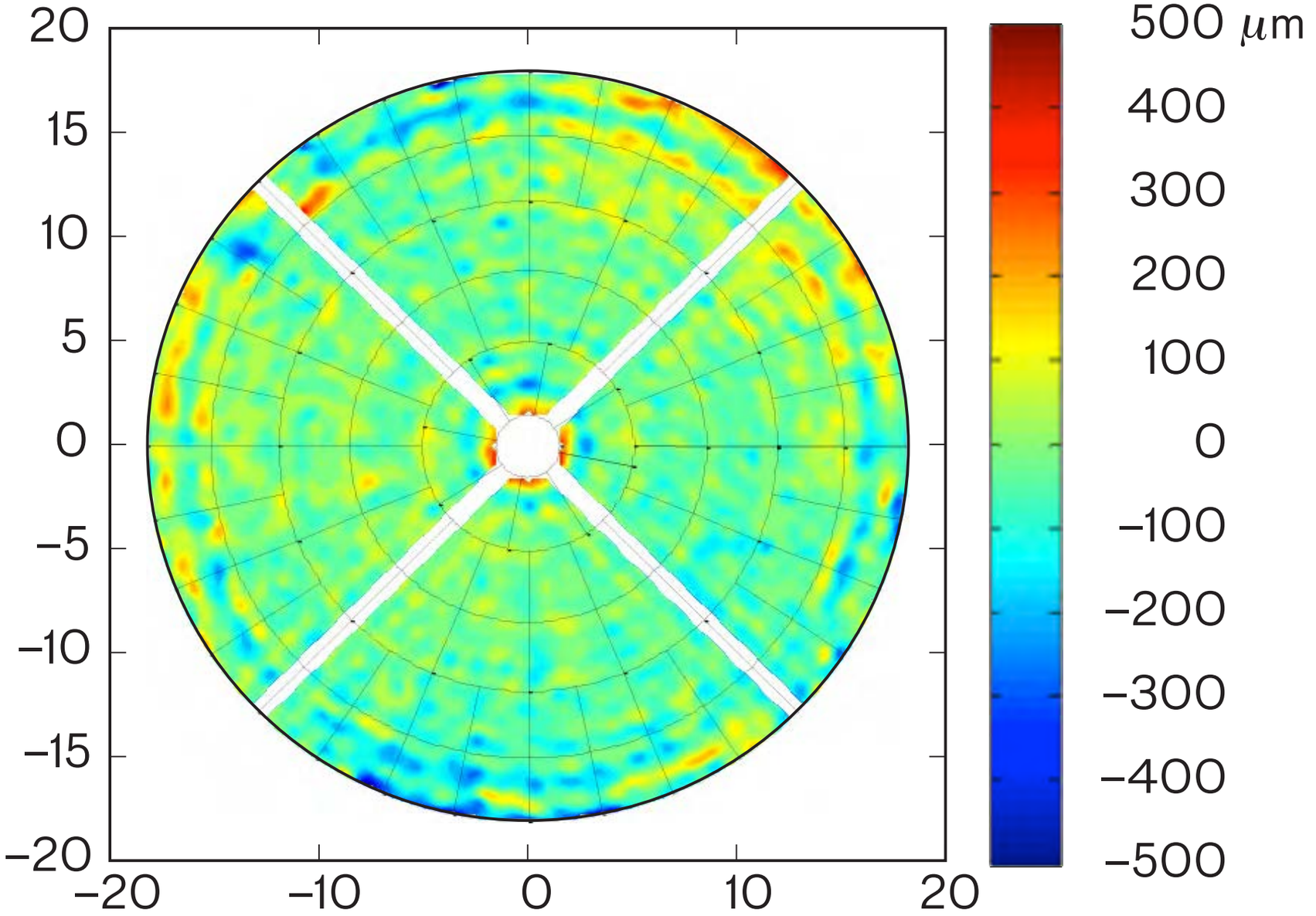
A Rejuvenated Telescope

dish replaced 2010–2013

still a 37m–telescope

now known as the
Haystack Ultrawideband Satellite Imaging Radar (HUSIR)

Excellent Dish Properties



Haystack surface RMS:

measured to be about 75 μm

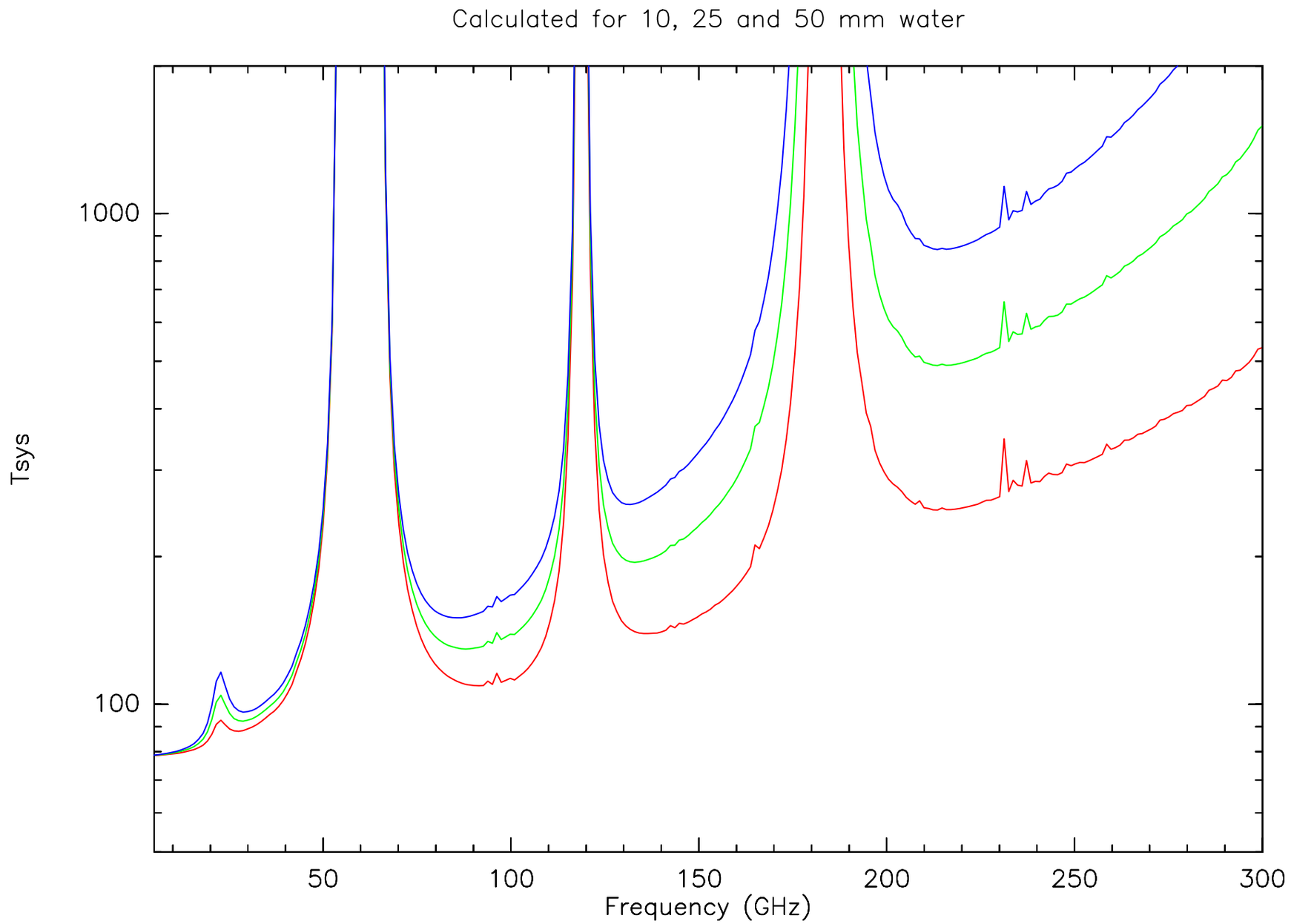
predicted to be <100 μm in operations

reference values:

IRAM 30m–telescope — ~50 μm

LMT — ~70 μm?

Acceptable Weather Conditions



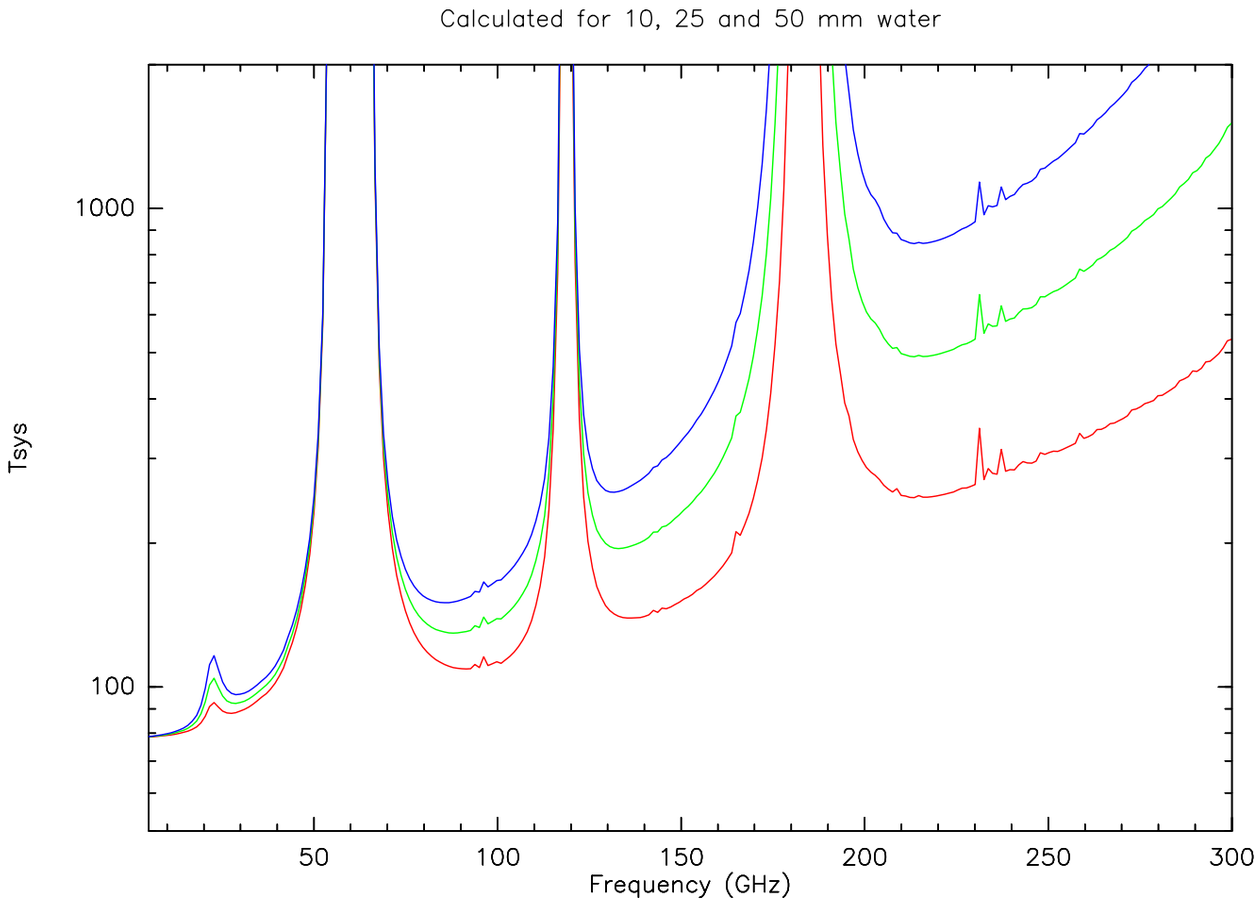
weather statistics for night:

PWV < 5 mm — 350 h

PWV < 10 mm — 870 h

actually quite reasonable

Radome Performance



transmission & obstruction:

20 GHz — 70%

50 GHz — 55%

100 GHz — 75%

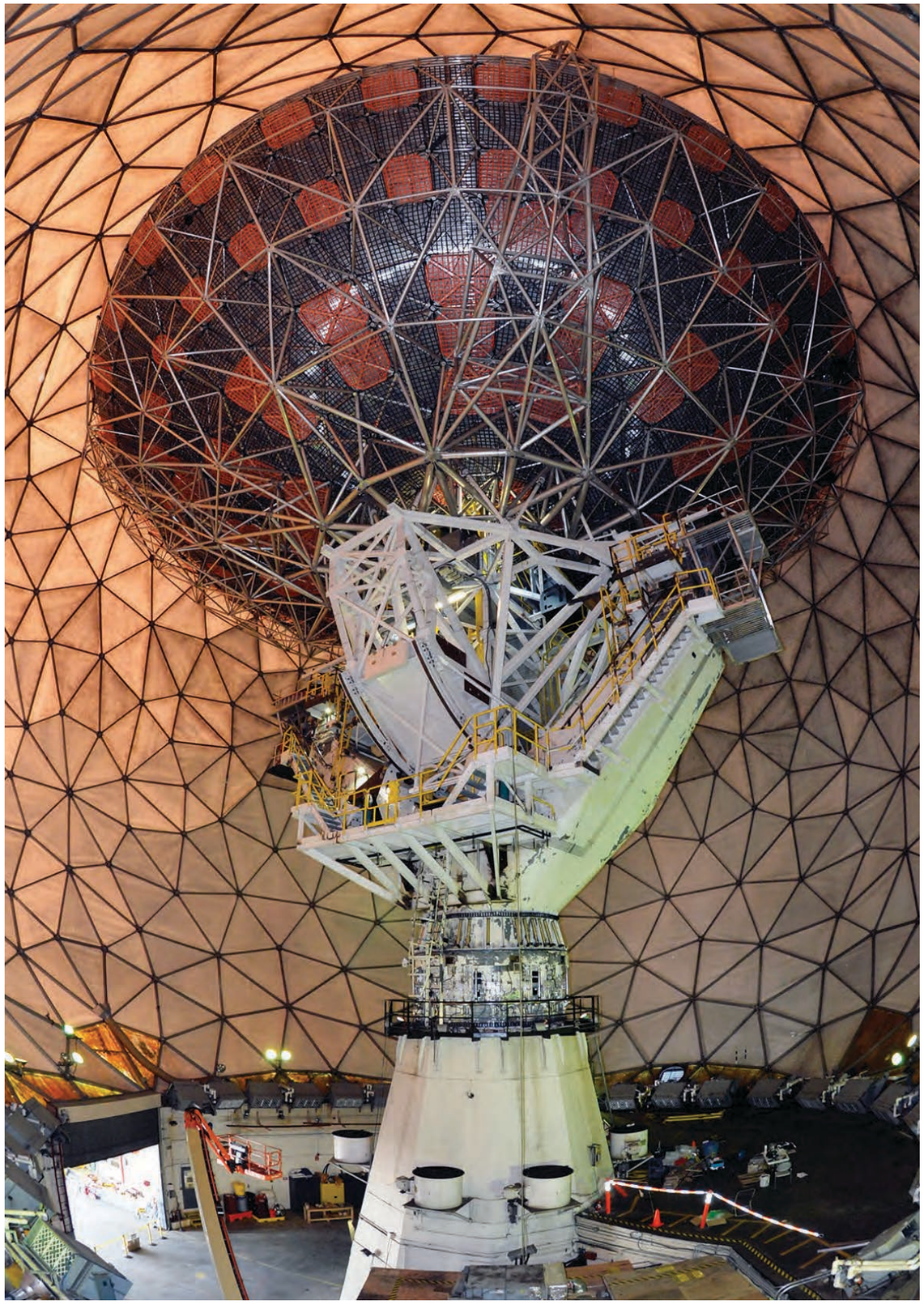
radome emission:

up to ~10 K

other factors:

standing waves

unstable continuum background

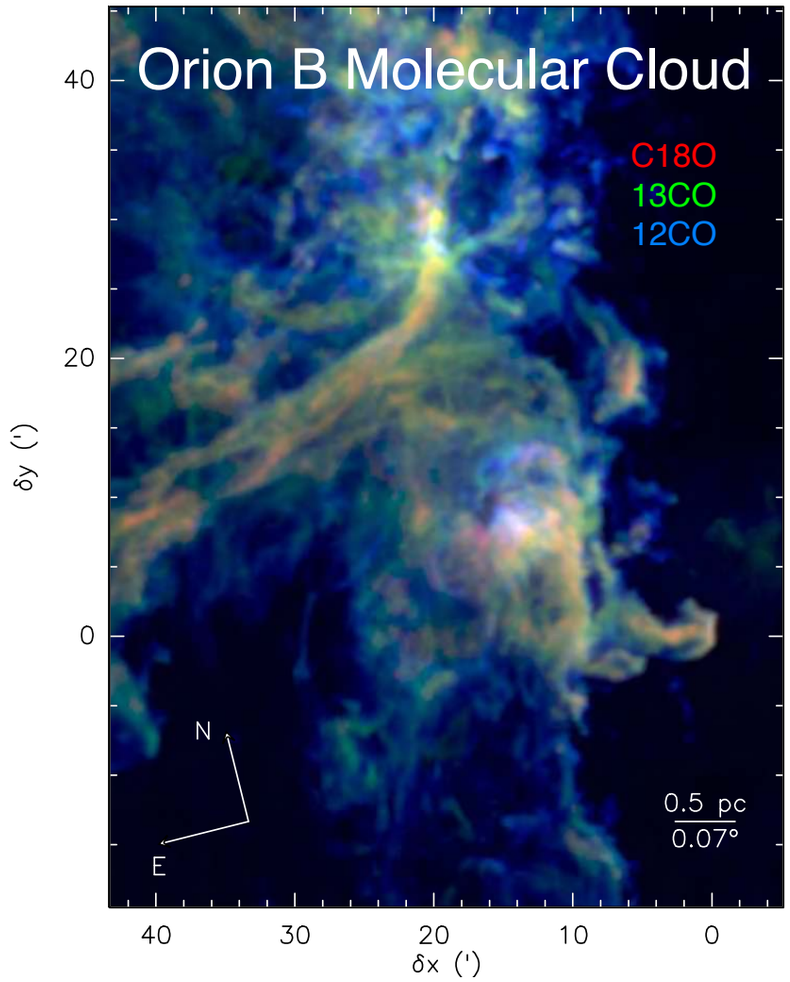


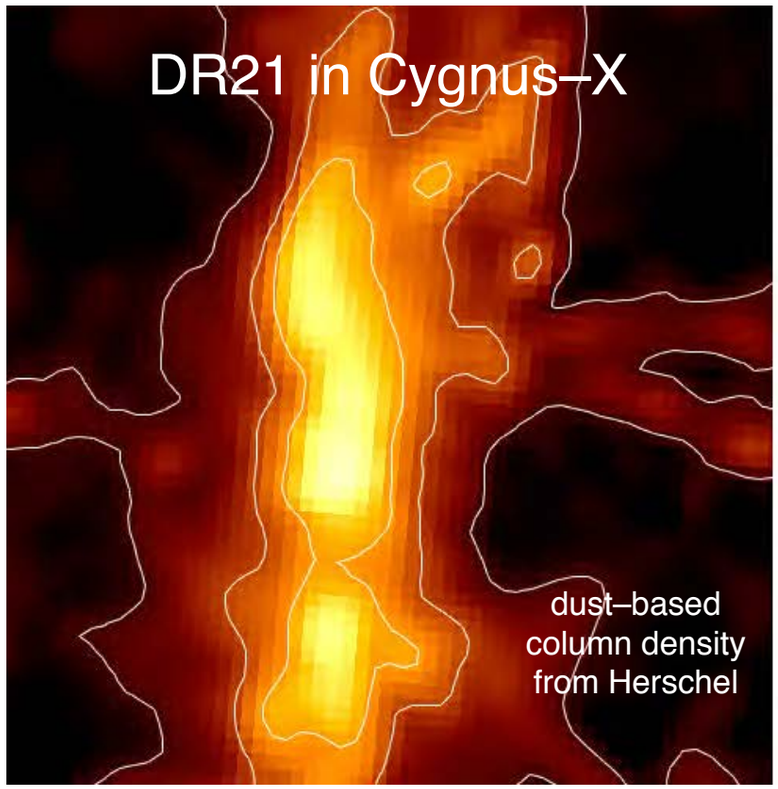
Educational Potential

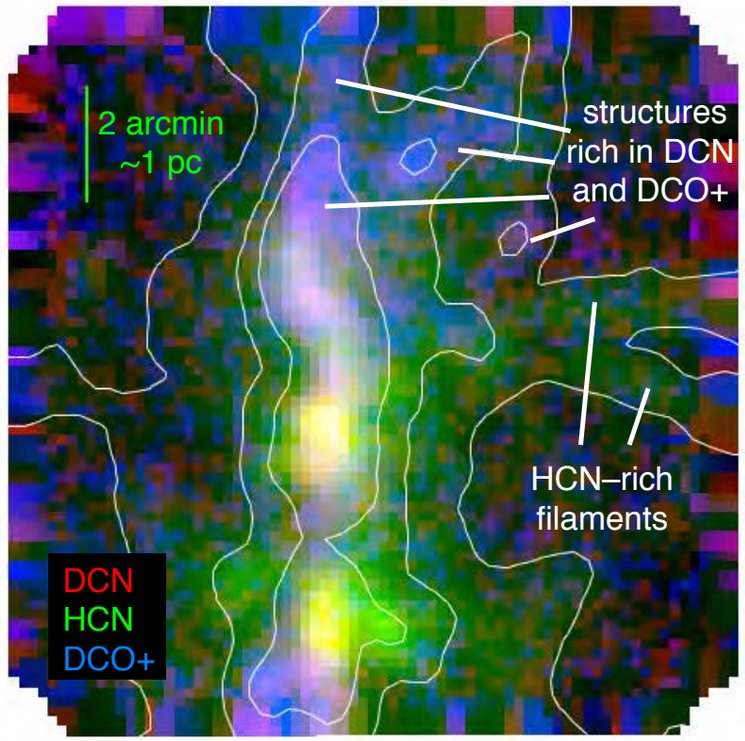
one of the few hands–on training opportunities in the nation

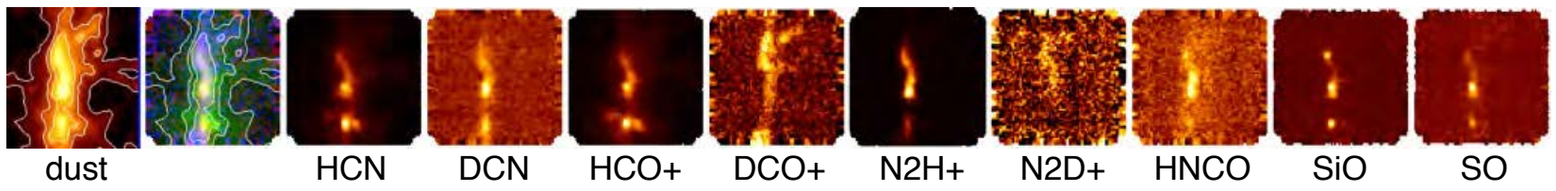
Scientific Potential I: The Molecular Universe

results from the he IRAM 30m–telescope









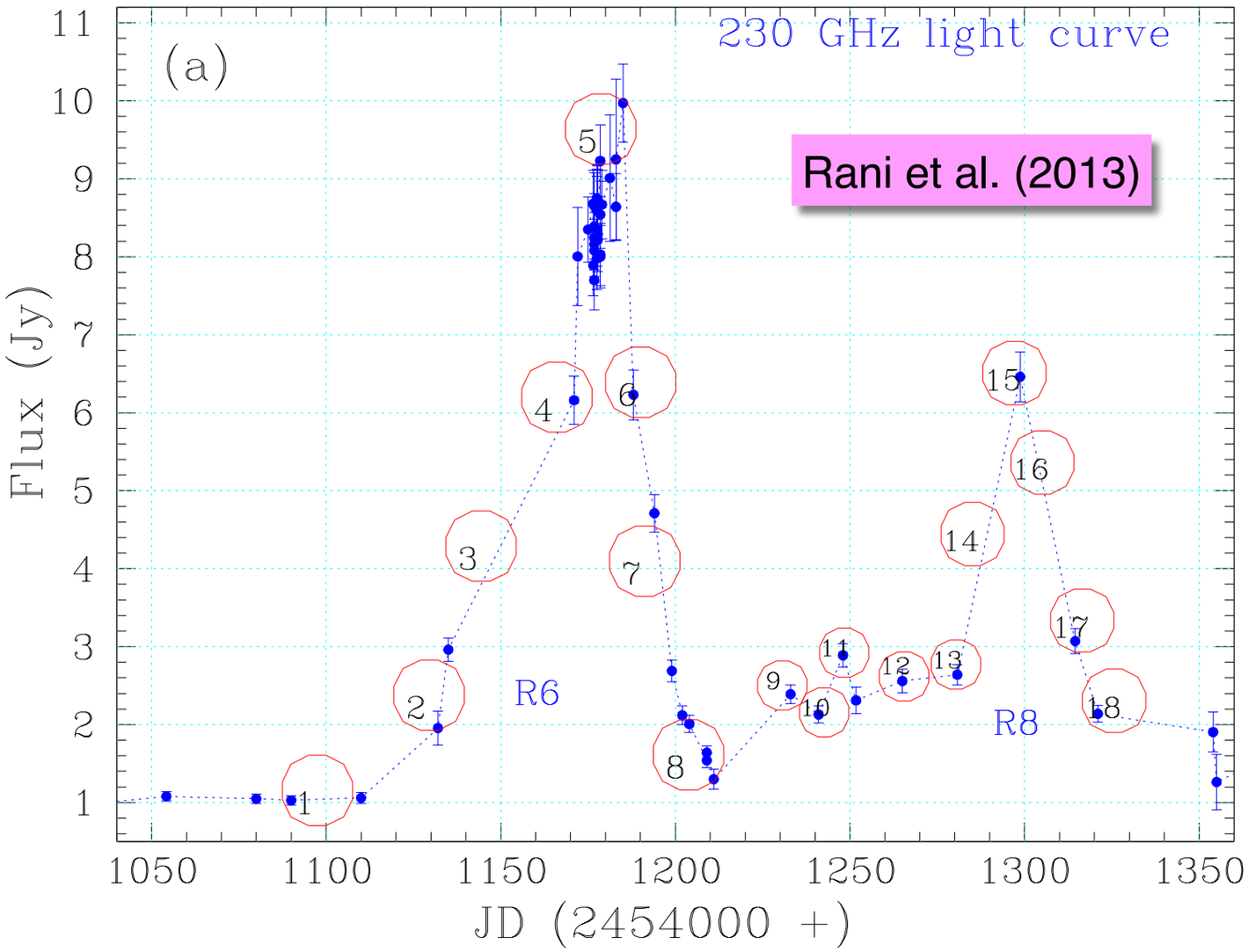
Kauffmann et al. (in prep.)

Haystack telescope abilities similar to those of IRAM 30m–telescope

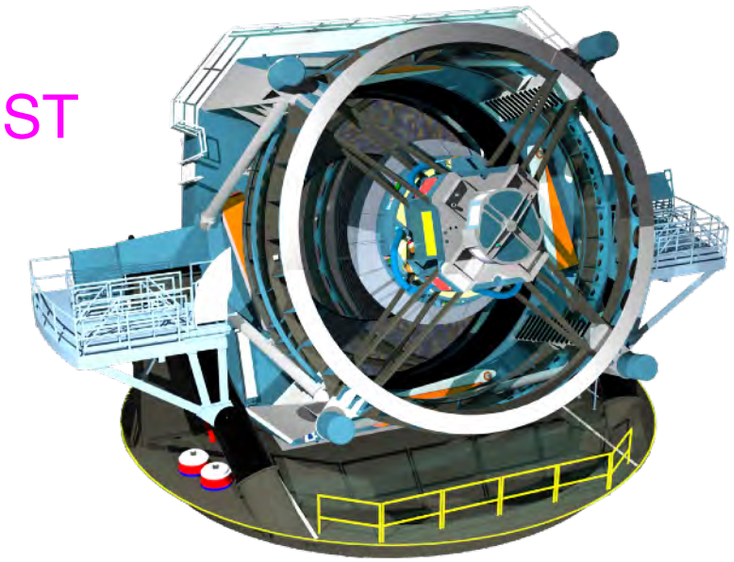
IRAM observes at high frequencies in good weather, so climate difference of limited relevance

Scientific Potential II: Time Domain

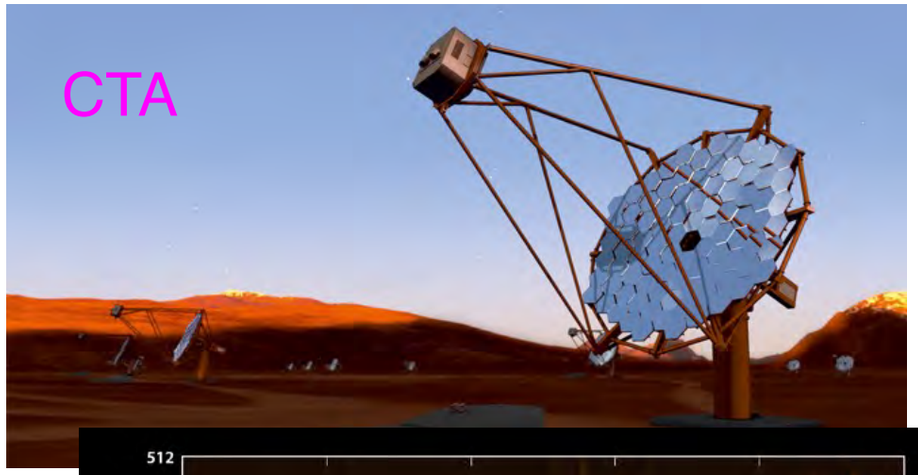
variability of blazar S5 0716+714

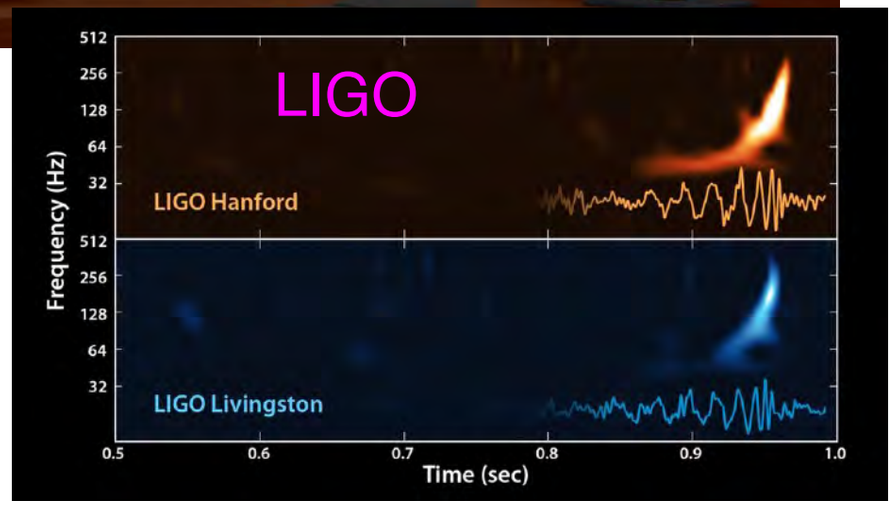


LSST



CTA





Haystack is extremely agile

can slew to any spot in ~60 seconds

could give priority to triggered observations

Towards a Science and Operations Plan

Science Case

needed to guide future development work

requires well–known sky and telescope properties to get started

science case should provide specifications that future hardware should meet

potentially a focus on time domain

to be compiled with a target date of about summer 2018

Operations Plan

manpower needed for operations, upgrades, and maintainance

might call for „legacy programs“ of >100 h that allow to minimize support

when to observe (winter only?)

Today

- lunch and coffee discussions
- see the telescope at 1:15pm

please contact me at jens.kauffmann@mit.edu to get involved