

# Fred Young Submillimeter Telescope @ SAACC

Mike Nolta, FYST Software Lead

2021 April 13

# Who we are

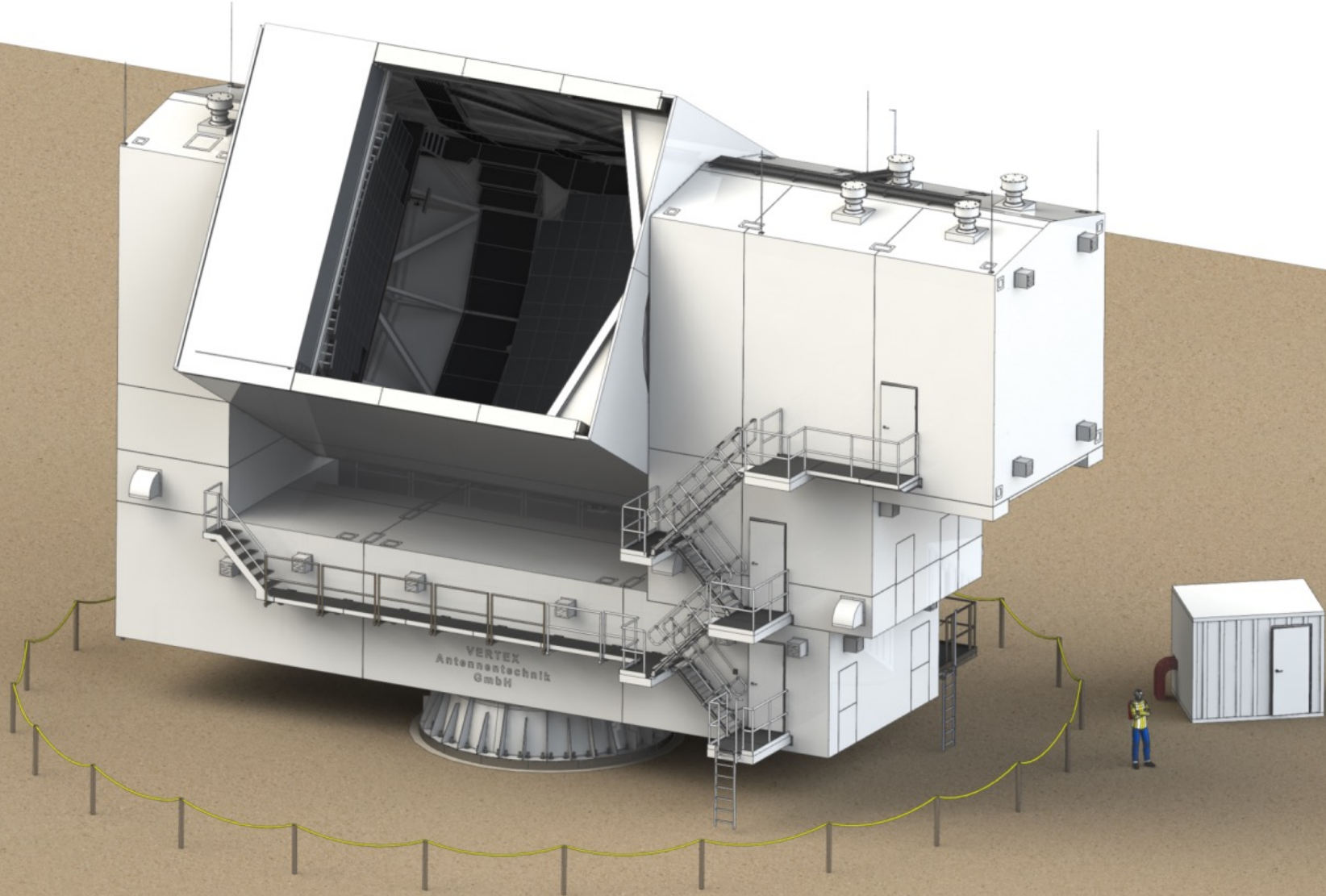
- Formerly known as CCAT-prime.
- Cornell University
- German consortium led by University of Cologne:
  - Cologne, Bonn, Max Planck Inst. for Astrophysics
- CATC (Canadian Atacama Telescope Corp.)
  - Canadian consortium led by University of Waterloo
  - Waterloo, Toronto, British Columbia, Calgary, Dalhousie, McGill, McMaster, Western Ontario
  - CATC “observers”/partners: St. Mary’s, Manitoba, Lethbridge, Alberta, National Research Council
- Chilean Universities: U. Chile, UCSC, PUC

# What we're up to

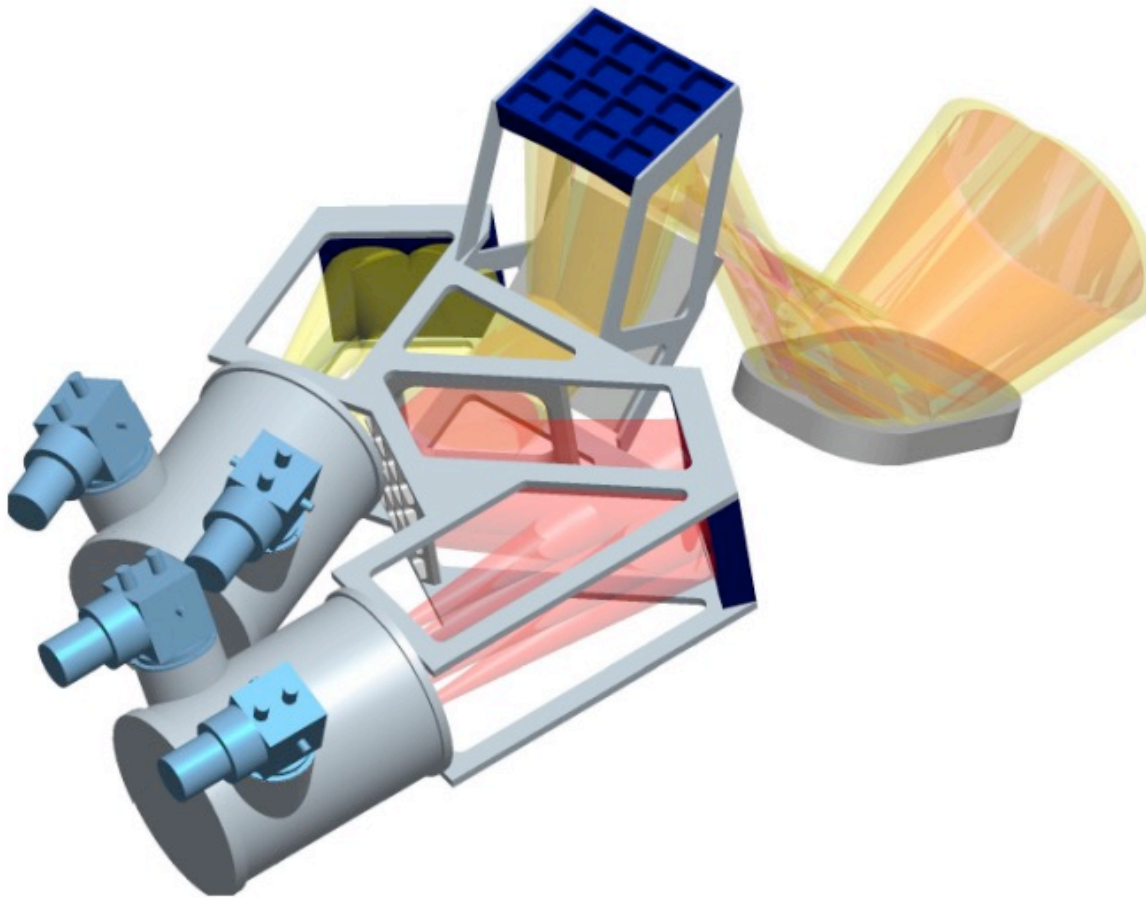
- FYST will be the highest throughput sub-mm telescope ever built:
  - 6m diameter mirrors, cross-Dragone design.
  - High surface accuracy ( $\sim 8\mu\text{m}$ ).
  - Large field of view (8 deg at 3mm).
  - Pointing error  $< 1.4''$ .
- Located on Cerro Chajnantor, near ALMA.
- Expected first-light late 2023.
- $\sim 3\text{-}8$  TB/day.





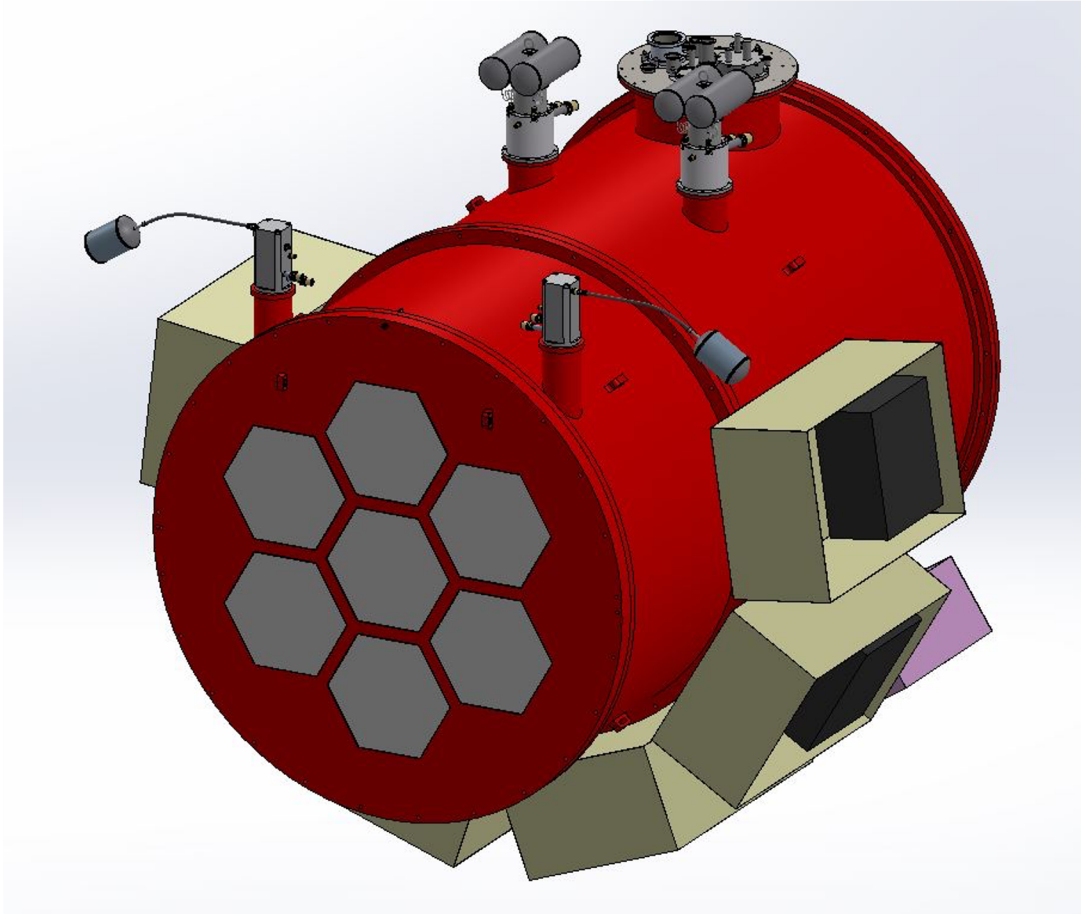


# First-light instrument: CHAI



- Multi-pixel heterodyne receiver
- 2 frequency bands:
  - 450-495 GHz
  - 800-820 GHz
- Galactic ecology, star formation and the interstellar medium
- [CI], [NII], CO line mapping

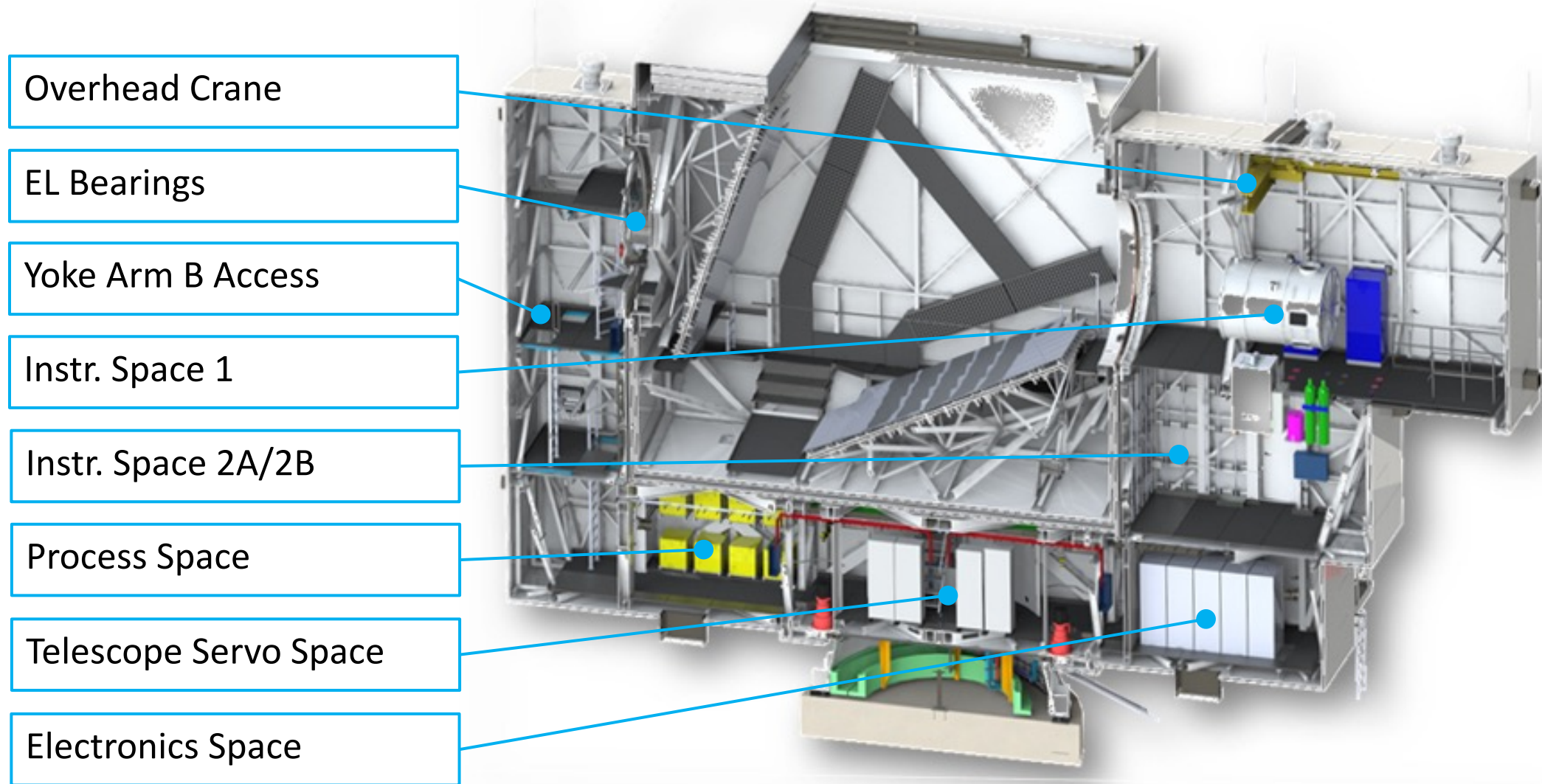
# First-light instrument: Prime-Cam



- 7 optics tubes, each tube with a field of view of  $\sim 1.3$  deg
- Cooled to 100mK in a 1.8m diameter cryostat
- 220-850 GHz (cameras), 250-360 GHz (spectrometers)
- Improved cosmological parameters from:
  - Epoch of reionization [CII] mapping
  - SZ clusters



# Telescope cross-section

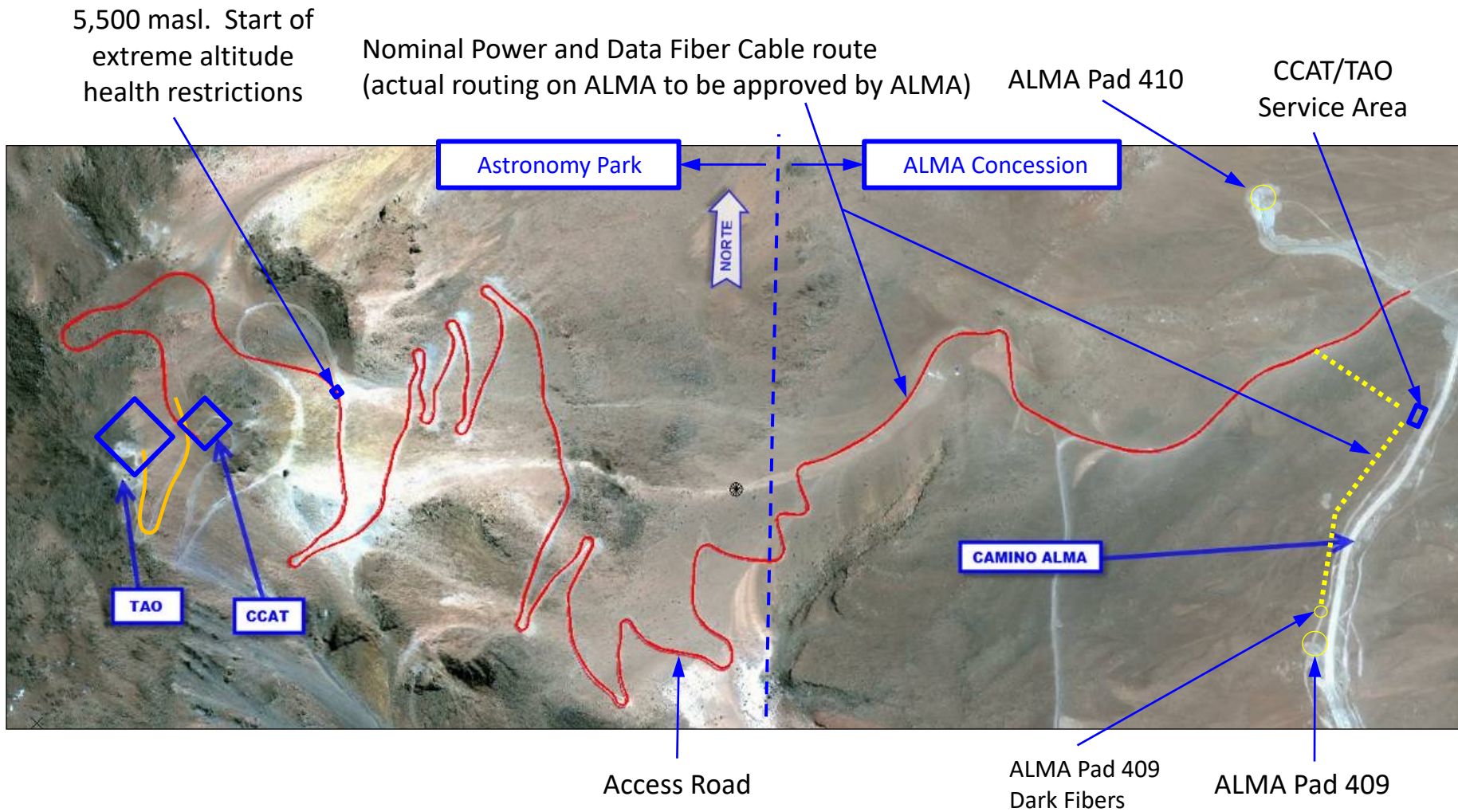




# FYST is at extreme altitude

- FYST is located on the eastern slope of Cerro Chajnantor, at an altitude of ~5600m.
- Chilean law changes at 5500m. Increased scrutiny and requirements above this height:
  - Hypobarica and extra medical tests required annually.
  - Region II Health SEREMI approves every company and receives reports on every individual worker.
- Fuel companies won't make regular deliveries at this altitude.
- So need to site our generators at a more accessible site, and trench power lines.

# Site layout

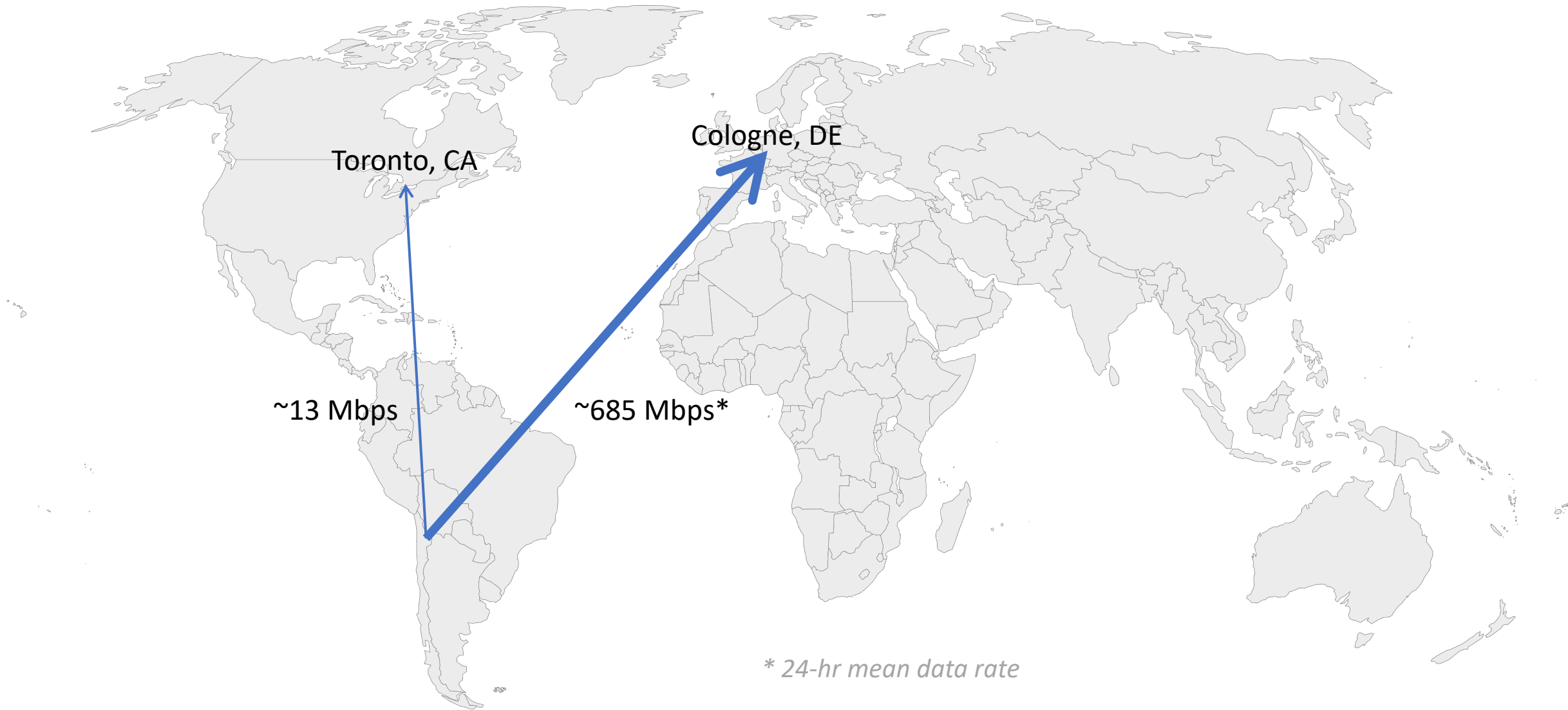


# Fiber network plan

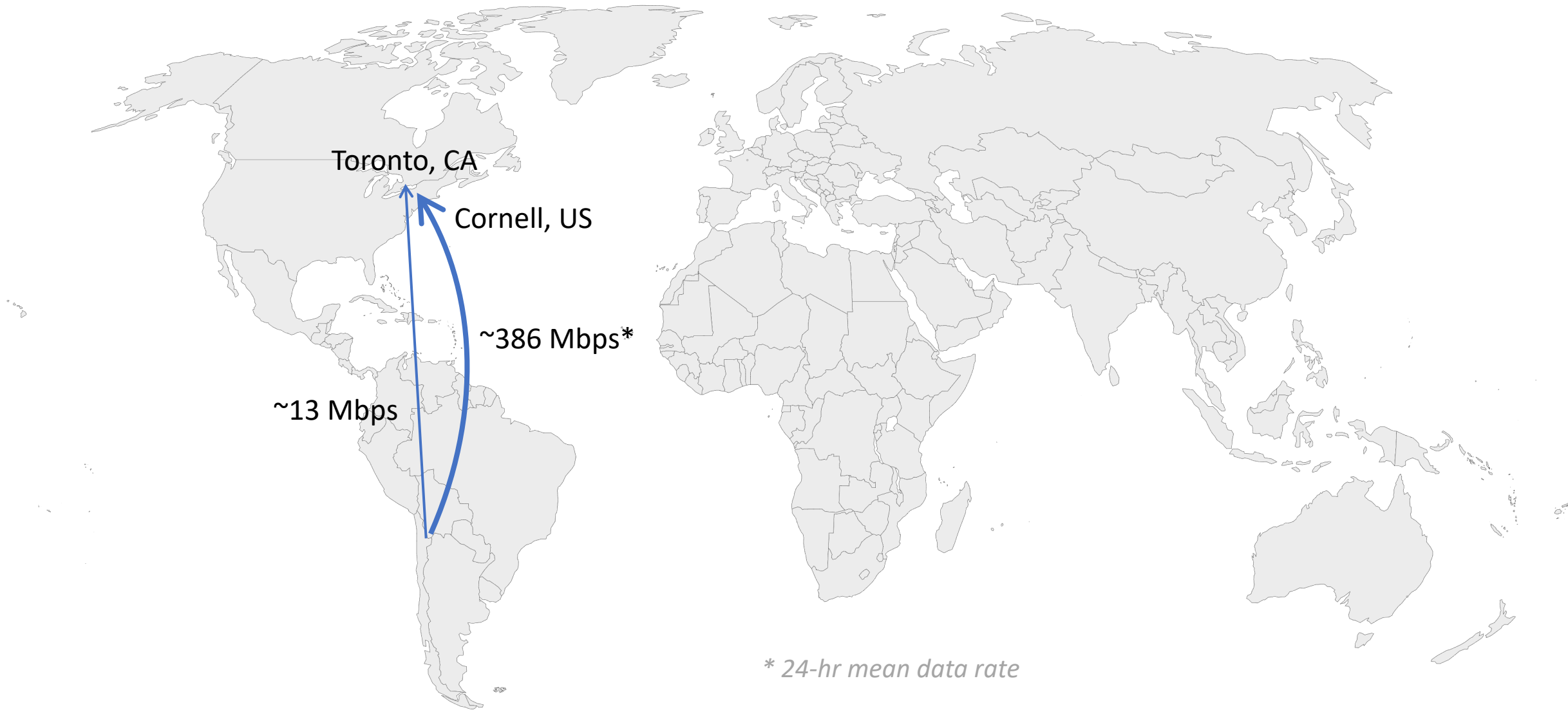
- Trenching power, so obviously install fiber at the same time.
- Service area is on ALMA property, near Pad 409.
- ALMA has kindly offered to lend us a pair of their dark fibers, connecting at Pad 409.
- Connect to REUNA PoP at ALMA.
- Working on formal agreements with ALMA & REUNA.



# Data rates during CHAI observing



# Data rates during Prime-Cam observing



# Summit has been leveled





# Manufacturing has begun



[www.ccatobservatory.org](http://www.ccatobservatory.org)