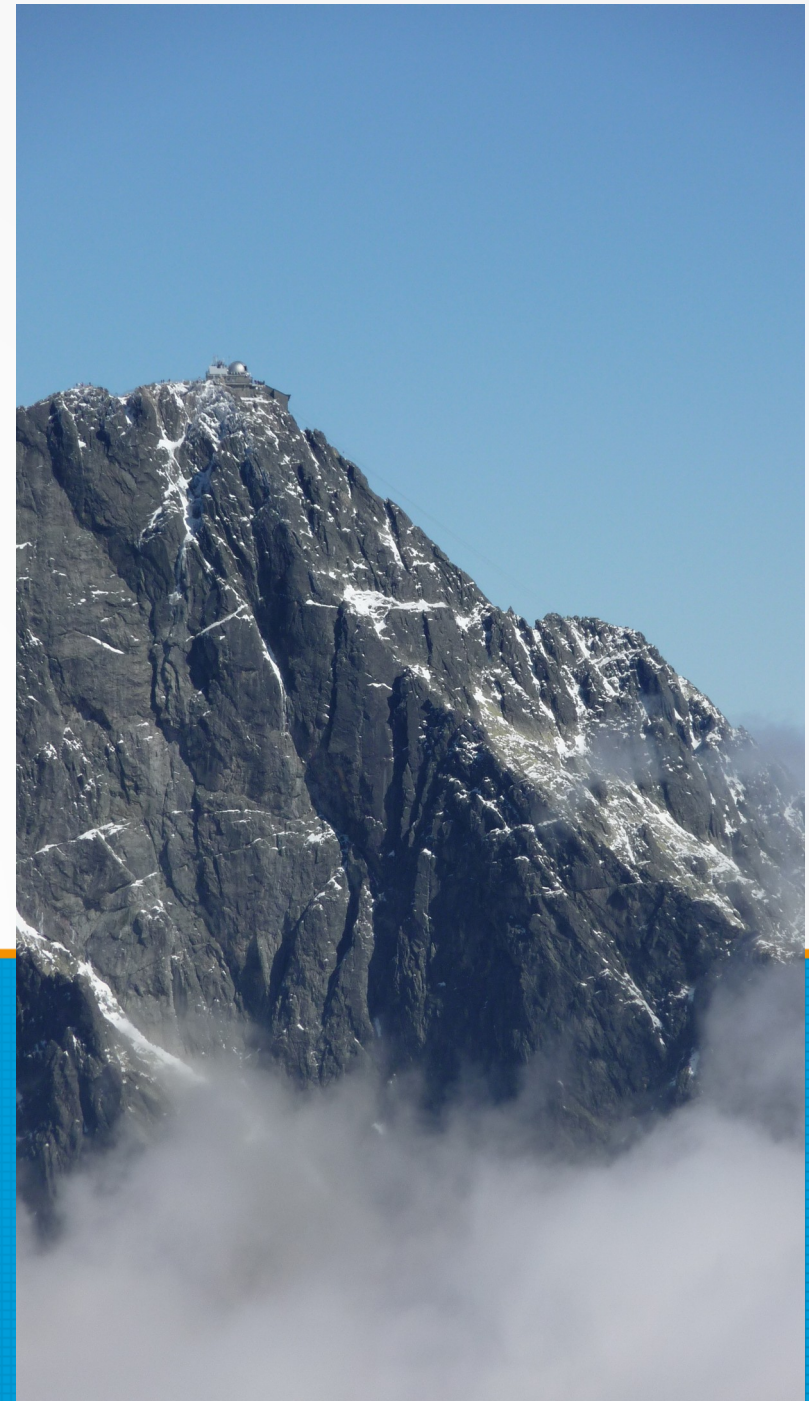


# LSO summer internship program: auxiliary “mi- nor” details

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2024

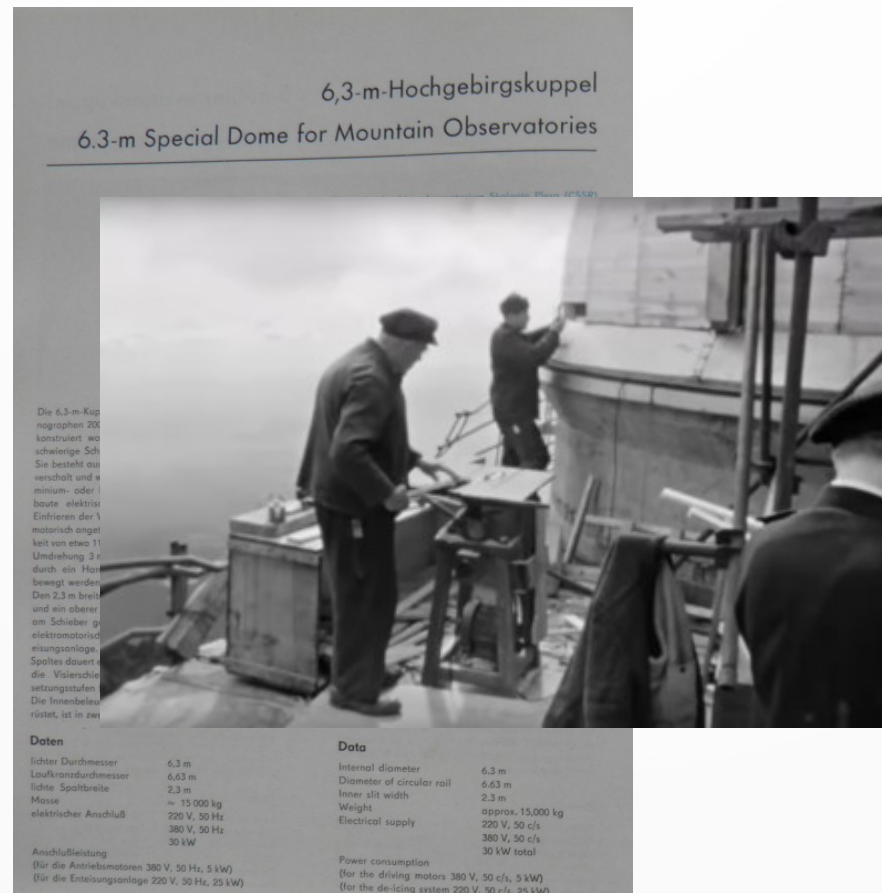
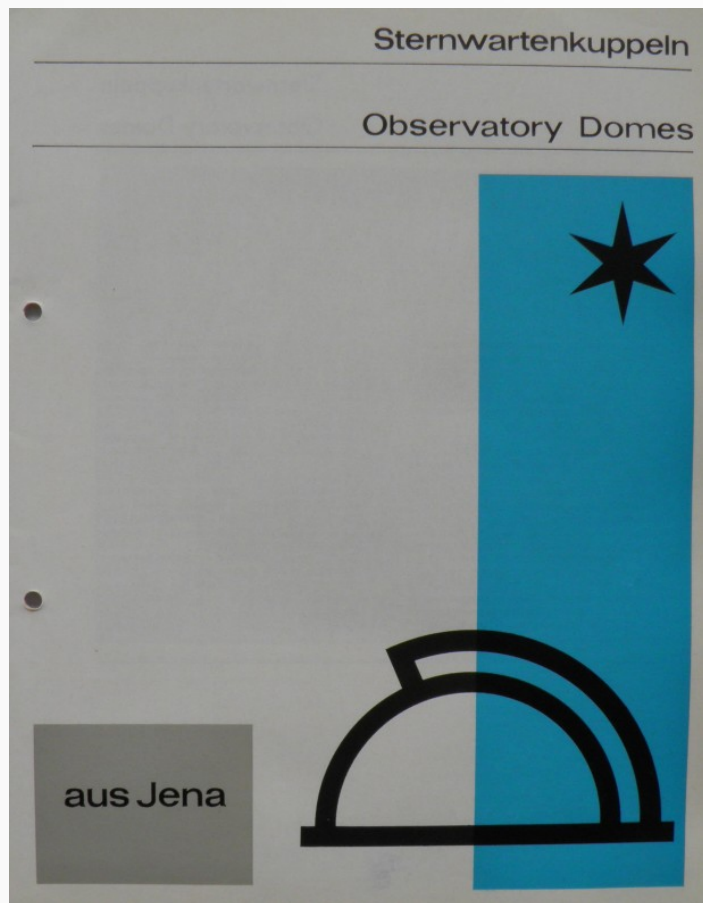


# Content:

- Few main topics:
  - dome and its slit: snow/ice problems
  - the isolated el. network
  - el. charge problems: unplugged/plugged/standby/on modes of the LSO instrumentation operation
  - heating of the dome and its surrounding: white painting
  - heating/cooling of instruments
  - server room and computer network
- Minor or major ?

# Dome and its slit:

- Carl Zeiss Jena production:



# Dome and its slit:

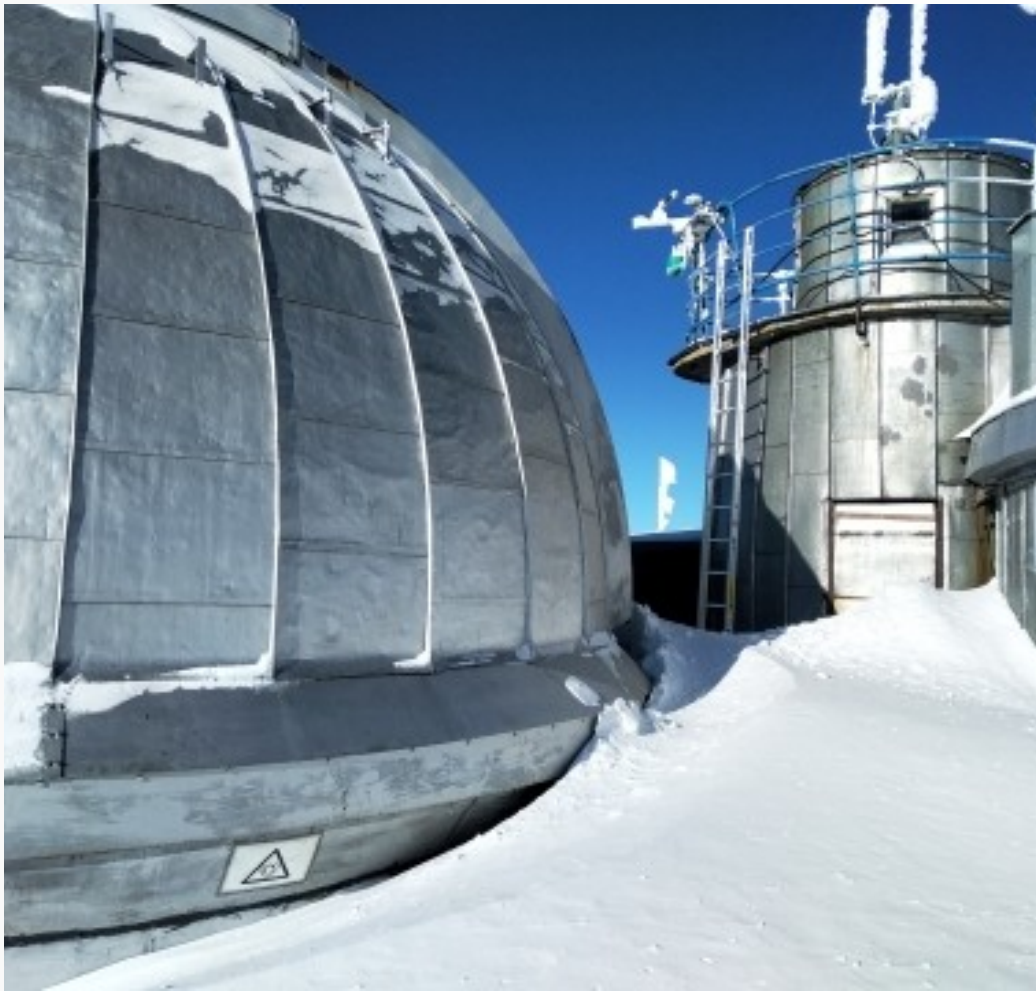
- Basic parameters: internal diameter 6.3 m, inner slit width 2.3 m, weight ~15 ton, full revolution ~3 min, slit open/close 2.5 min
- Slit: two splitting parts, opening vertically
- Dome revolution & slit motion: manual, motorized
- LSO addition - automatized dome revolution: step-by-step motion for 6 cm from time to time to follow the Sun in azimuth

# Dome and its slit:

- Prophylactics: critical part not to meet the LSO nightmares
- Summer operation:
  - Rain & wind
  - Thunderstorm emergency: el. charge, lightning hit → change of the el. charge (sign)
- Winter operation:
  - Below zero temperatures → freezing
  - Snow/ice removal – manual, solar heat
- Daily usage:
  - Cooling down in the morning/evening

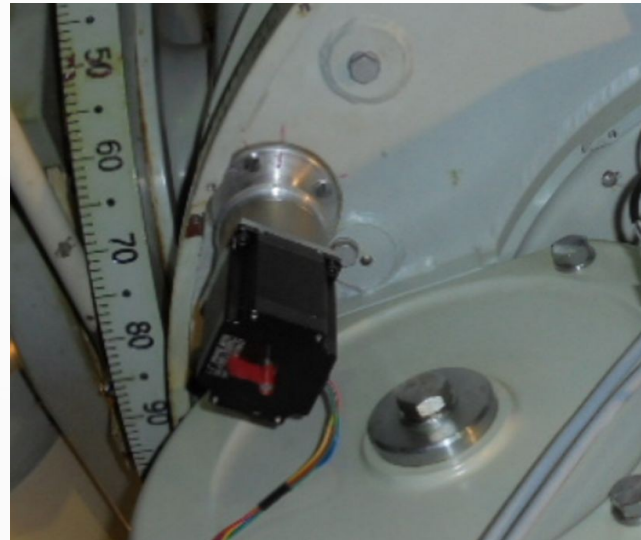
# Dome and its slit:

- Snow/ice removal – manual, solar heat



# Mount:

- Mechanics:
  - Mount: northern axis, equatorial plane, hour angle and declination axes, fixing coronagraph~mount
- Electrics:
  - motor drives



# Isolated electric network

- Security reasons – possible shortcuts (broken cable, damaged insulation)
- Mount/coronagraphs/post-focus instruments/PC dome
- Transformer 1:1 (230 VDC)

# Electric charge problems:

- el. charge problems? Let's make a Faraday net properly grounding the electric devices and instruments
- Faraday net at the LSO: lightning conductors, granite, rusty ropes, good ground at the START cable car station (~4 km away)
- Consequences for instrumentation:
  - LSO operation modes: unplugged/plugged/standby/on
  - Basic mode: unplugged
  - Good weather forecast: plugged
  - Early morning preparations: standby
  - At least ~1 hour before observations: on

# Dome heating:

- No heating of the dome installed and used
- Observations: natural heating by light falling in
- Consequences:
  - Temperature difference between dome air and ambient air → exchange of air masses → spatially and temporally variable refractive index → variable distortions of the image
  - Too hot air in the dome for cooling of the post-focus instruments

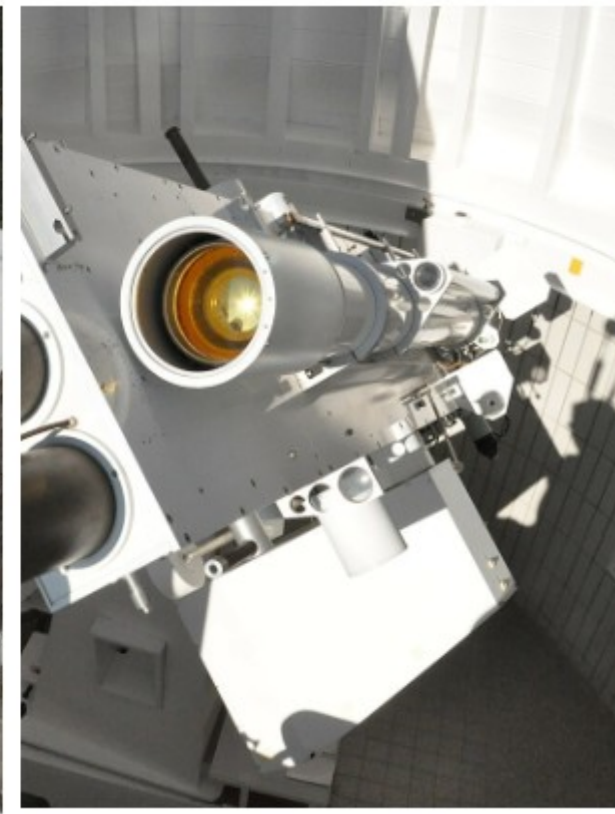
# Dome heating:

- Minimizing the dome air temperature:
  - 2024: TiO<sub>2</sub> painting inside the dome (at least minimum of surfaces)

LSO 2023



KSO 2024



# Dome heating:

- An interesting alternative: dome “a la THEMIS” (stopping the light to fall inside the dome (EIE Group: <https://www.eie.it/en/progetti/themis-project>)



# Heating/cooling of instruments

- Storage temperature range & operation temperature ranges
- Heating/cooling: keeping different part of the instruments the storage
- Parts of this system: power source (backup), heaters+fans, electronics

# Server room and computer network

- Server room with a rack in the basement of the coronagraph pillar
- UPSs, network switches (TP,FO), servers (for instruments and data handling and temporal storage)
- Air conditioning system of a strange installation
- Metal TP cables, FO cables, wifi
- 2 independent connection to the rest of the world (radio→FO)

# Server room and computer network

