

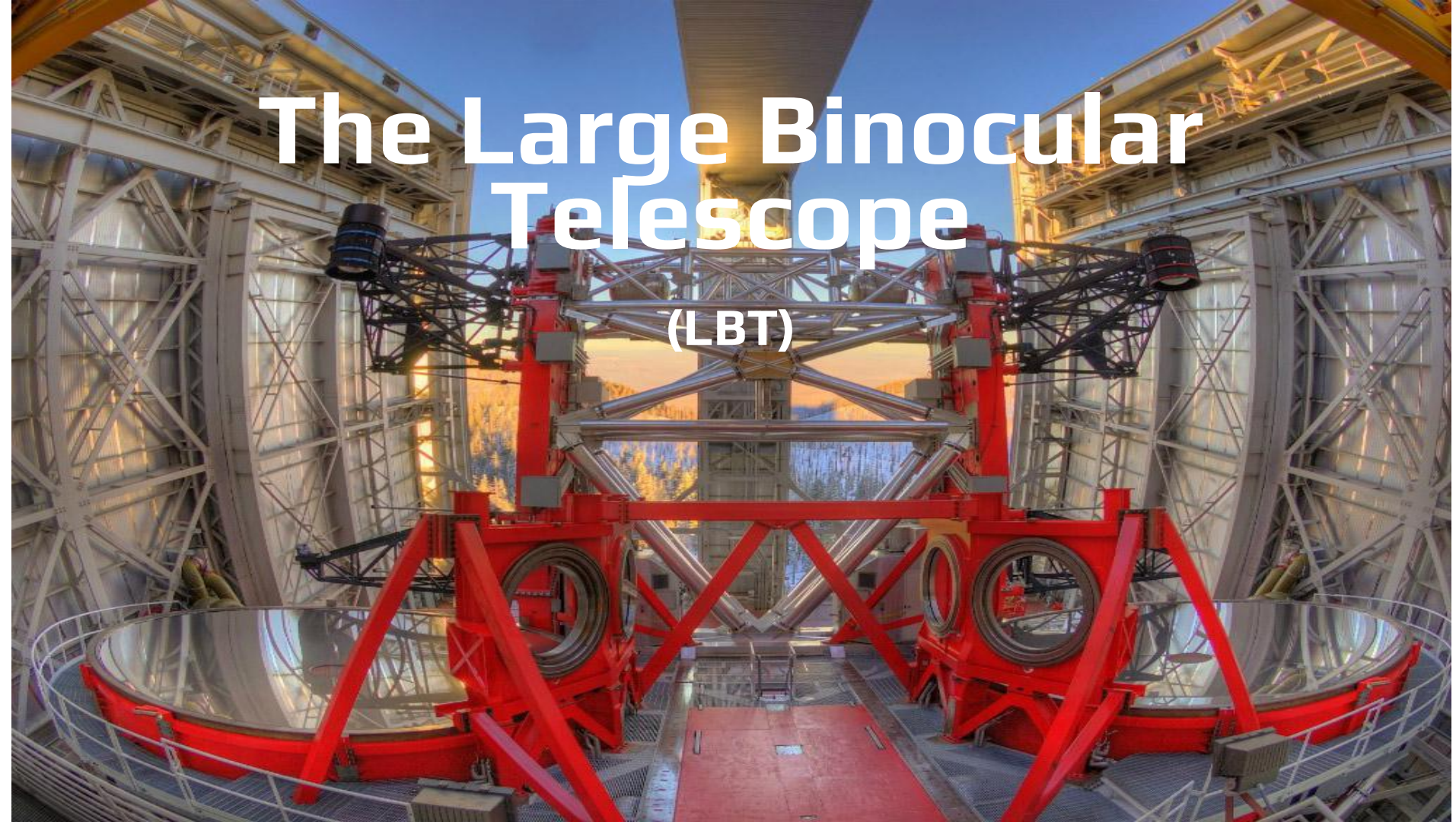
Preparation of Observing Scripts for LBT

Andrea Rossi
INAF - OAS Bologna

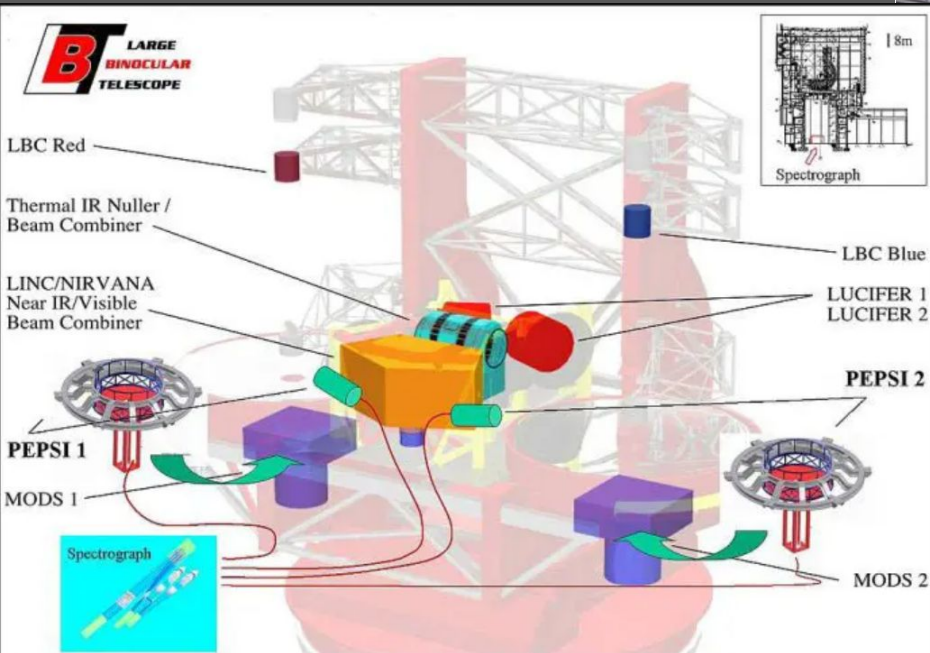
Astrophysics Centre for Multimessenger Studies in Europe
(ACME) project - Joint Centres of Expertise activities.

The Large Binocular Telescope

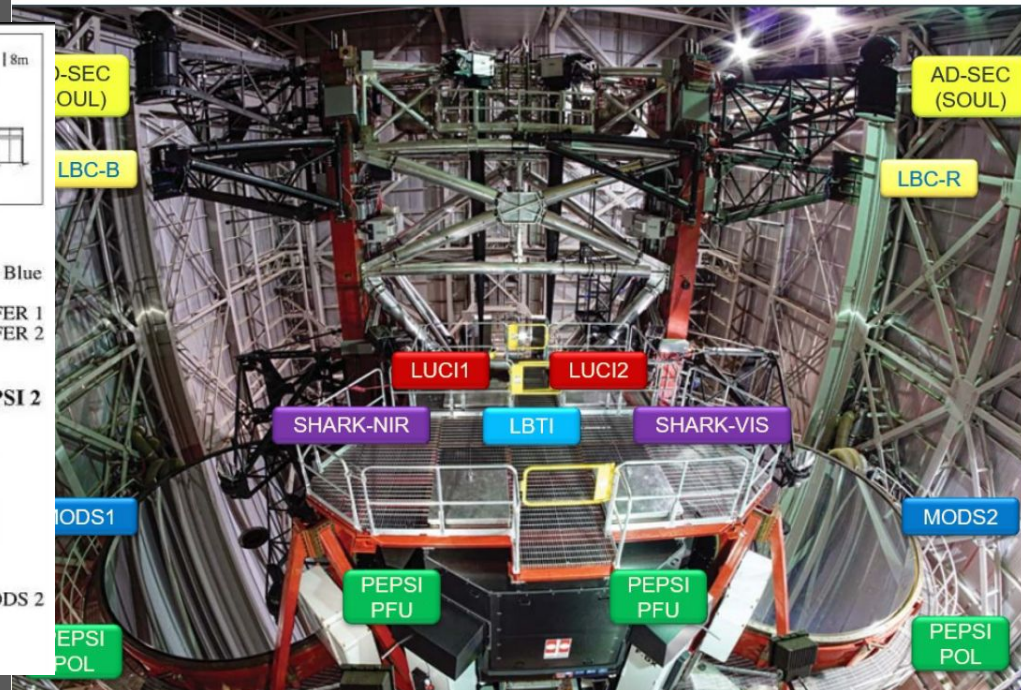
(LBT)



Operational Diagram



<https://scienceops.lbto.org/>

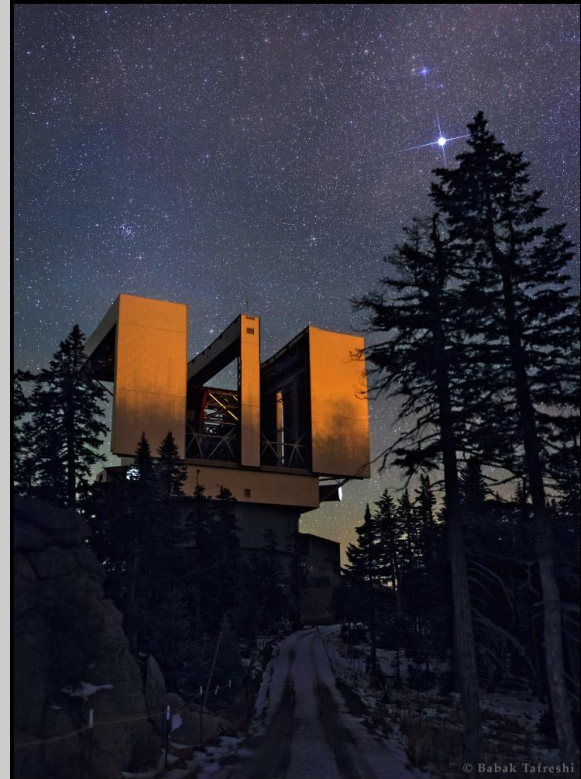


<https://lbt.inaf.it/instruments.html>

LBT Technical Specifications

- Observing Site: Mt. Graham (AZ, 3200 m)
- Aperture: 2 x 8.4 m
- Instruments imaging: **LBC** (Opt), MODS (Opt), **LUCI** (NIR)
- Instruments spec : **MODS** (Opt), **LUCI** (NIR), PEPSI (Opt-HR)
- Average seeing: 1"
- **International Observatory:**

INAF is a primary partner <https://lbt.inaf.it/>



© Babak Tafreshi

LBC overview

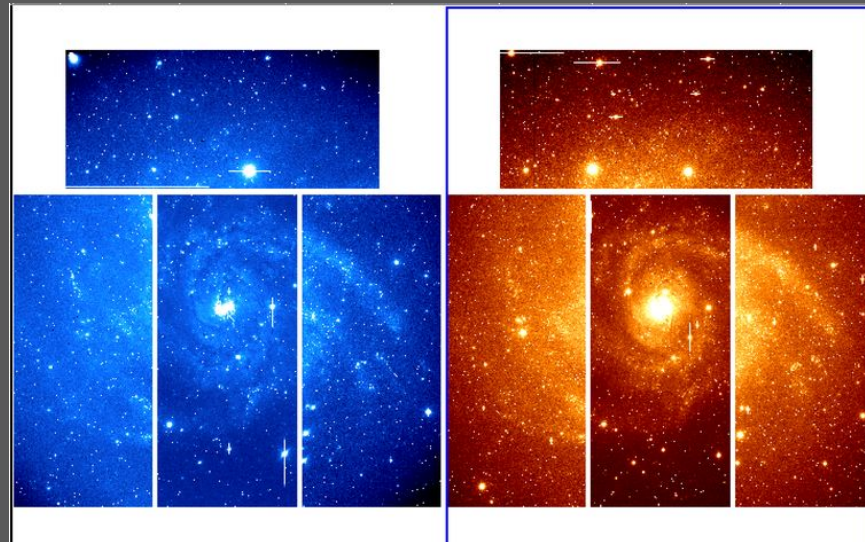
Wide-field imaging at the prime focus

Field of View (FoV): 23' x 23' ($\sim 0.15 \text{ deg}^2$)

Pixel Scale: 0.225"/pixel

Dual-Channel Simultaneous Imaging:

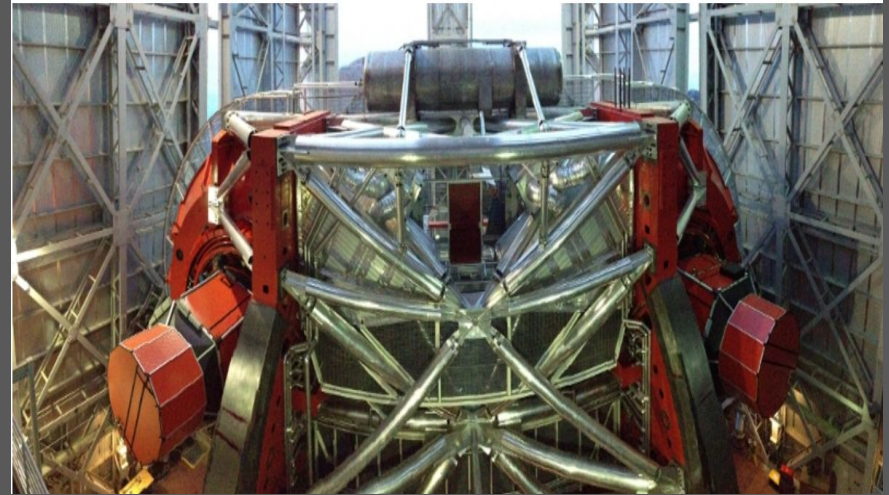
- LBC-Blue: Optimized for U, B, g, V (350-500 nm)
- LBC-Red: Optimized for V, R/r, I/i, z (550-1000 nm)



Large Binocular Camera:
<https://scienceops.lbto.org/lbc/>

MODS overview

- Two identical instr: **MODS-1 & MODS-2**
- Spectral coverage: **0.3–1.0 μm**
- Spectral resolution:
R ~ 1000-2000 Long slit: 0.6", 0.8", 1.0", 1.2", 2.4"
- **Long-slit + Multi-Object Spectroscopy**
MOS up to 30 objects
- **Imaging** ugriz FOV 6x6arcmin



<https://scienceops.lbto.org/mods/>

LUCI overview

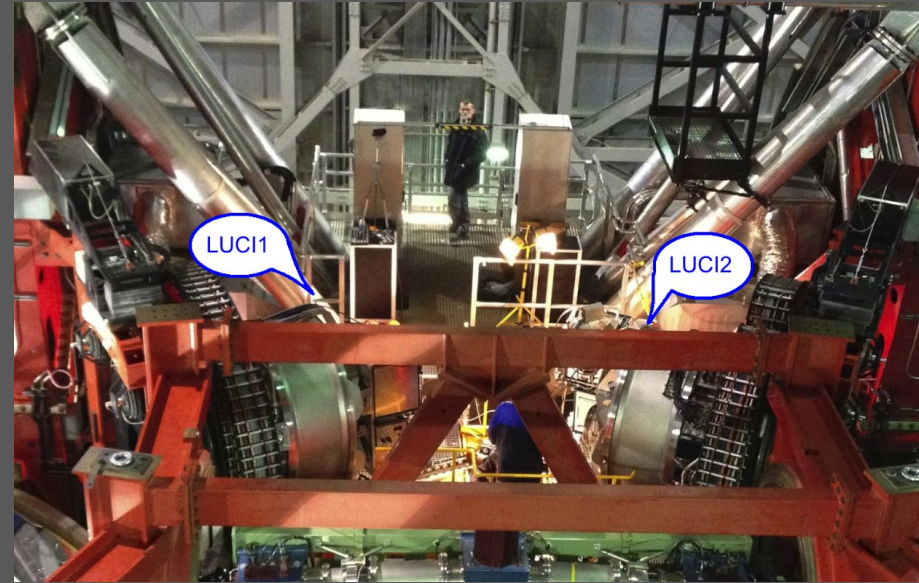
Two identical instr: LUCI 1 & LUCI 2

Spectral coverage: 0.9 – 2.4 μm

Spectral resolution: $R \approx 1000\text{-}2000$
slit: 0.5", 0.75", 1.0", 1.5", 2.0"

Long-slit + Multi-Object Spectroscopy (MOS)
up to 20 objects in 4' $\times$ 4'

Imaging SL / AO assisted



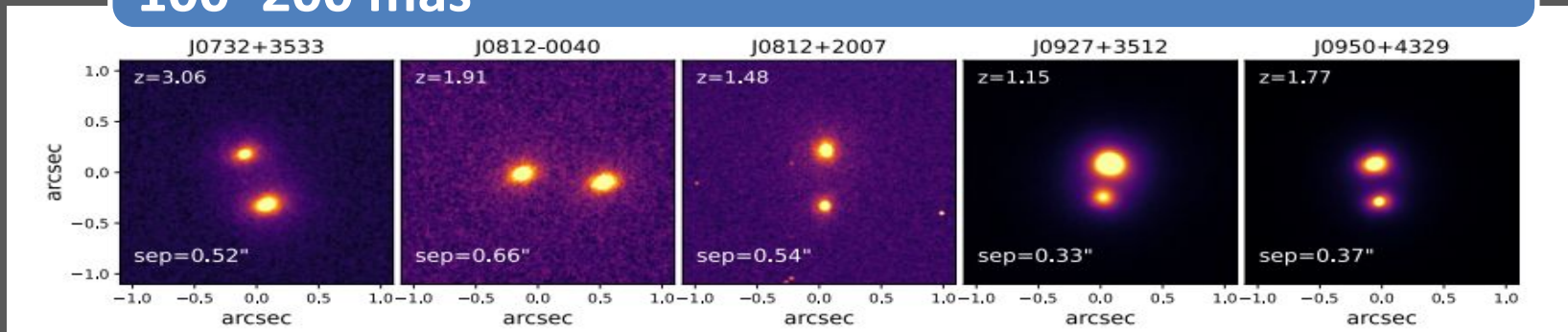
<https://scienceops.lbto.org/luci/>

LUCI-AO: high resolution imaging

Adaptive optics with **NGS - FOV 30"X 30"**

On-axis bright guide star: resolution ≈ 50 mas (K band)

Faint target near bright star (20–30"): resolution ≈ 100 –200 mas



Mannucci et al. (2022)

Useful Links for LBT Users

- **LBT Science Operations (instruments documentation & ETCs)**

<https://scienceops.lbto.org/>

- **LBT Observing Schedule**

<https://www.lbto.org/2026a-observing-schedule/>

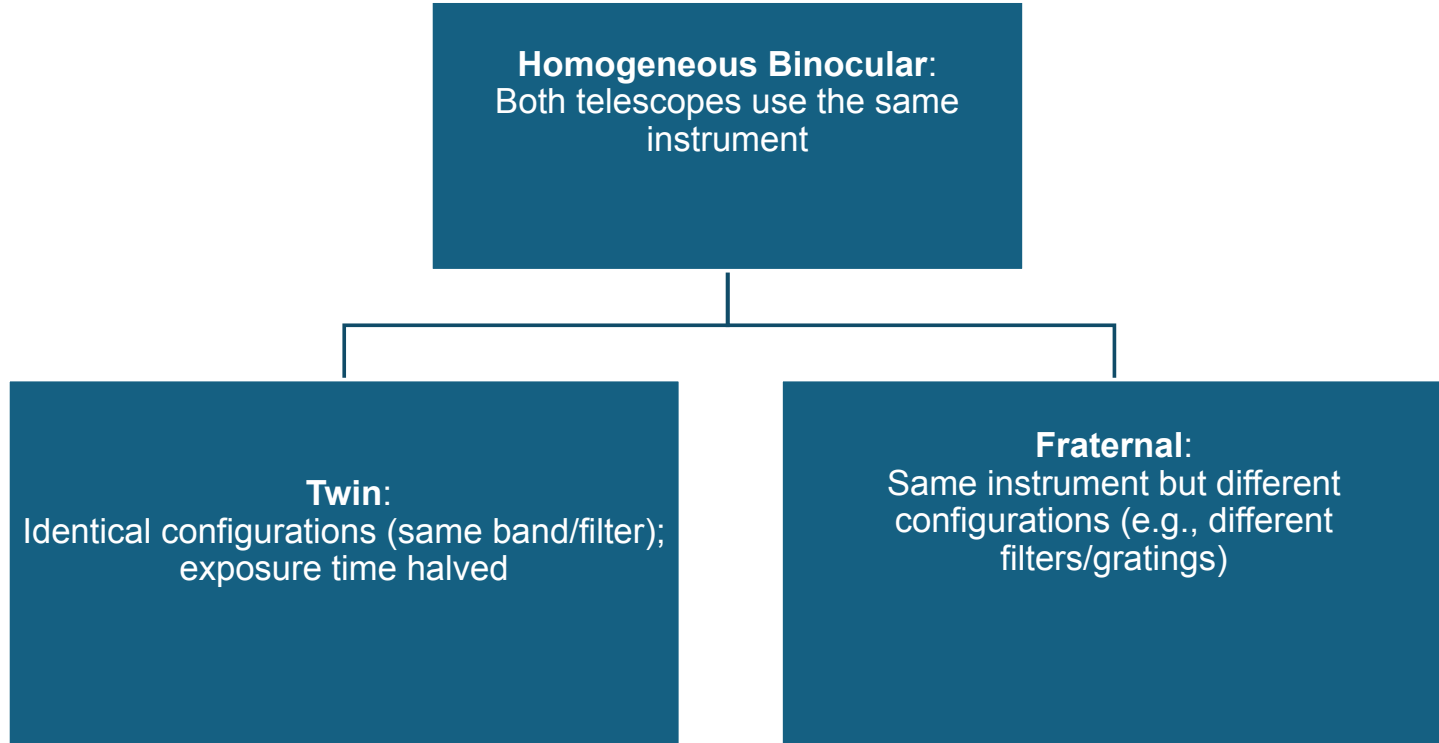
(the semester changes, e.g. 2026B, 2027A, etc.)

- **For assistance**

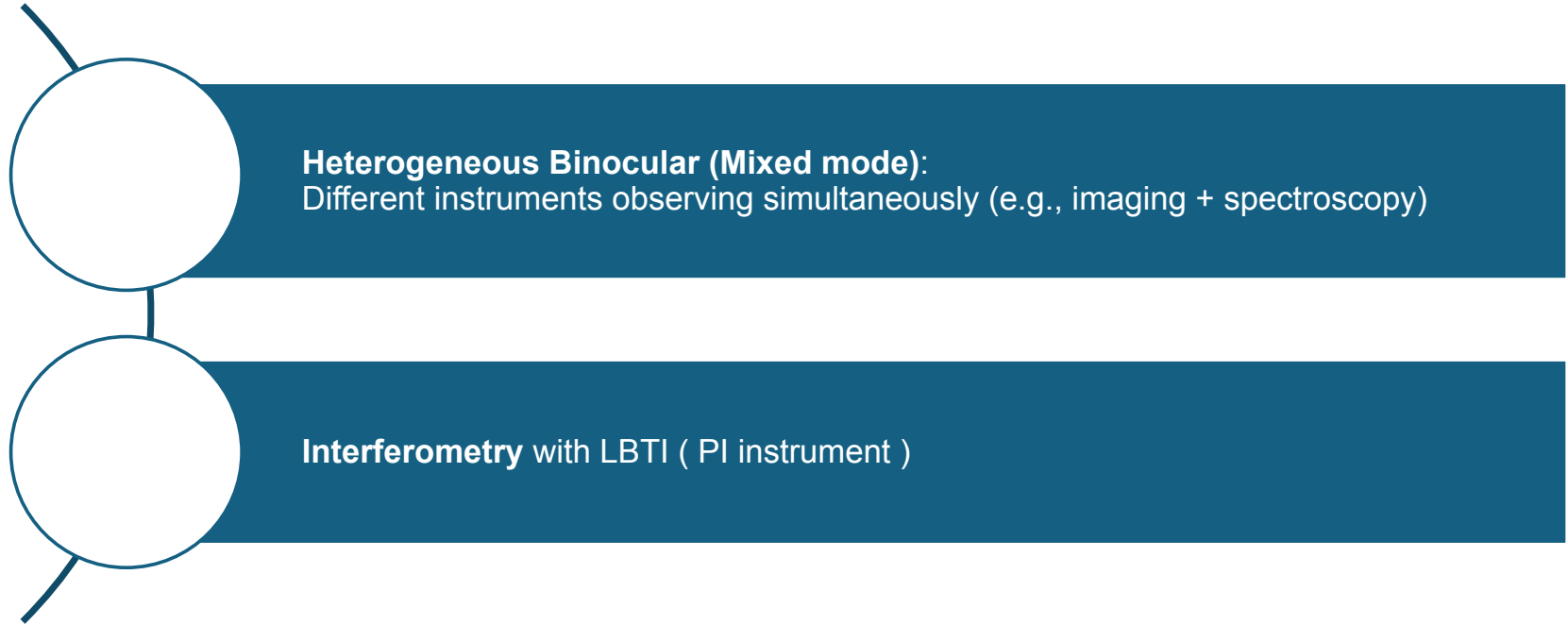
lbt-italia@inaf.it

lbt-italia-obs@inaf.it

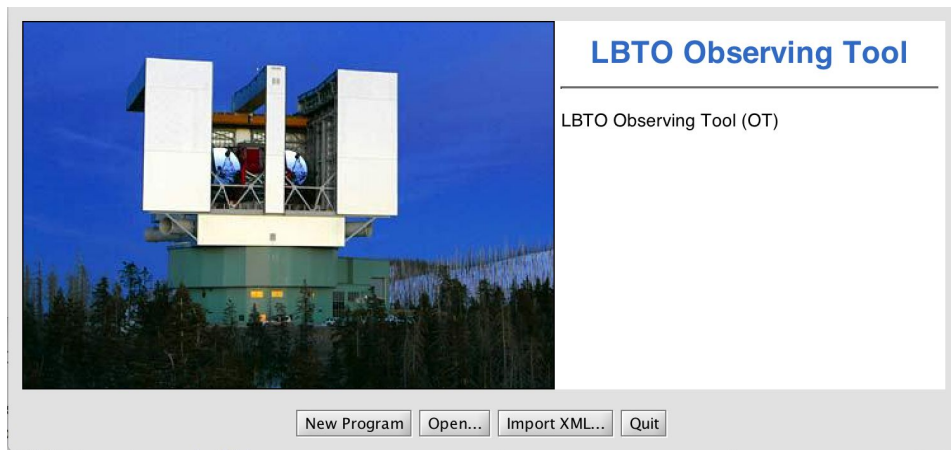
Observational Modes



Observational Modes II



Script preparation with **LBTO Observing Tool (OT)**



- **Non ToO:** wait the LBT-partner team to ask those for you

ToO: the team should contact you at the beginning of the period, but it is fine to ask

- **We need a Finding Chart:**

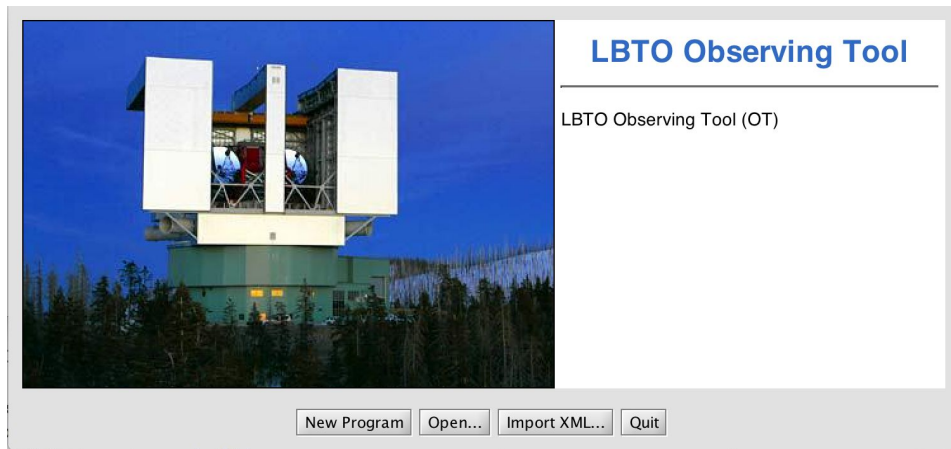
Provide a finding chart with indicated orientation. Please use a filter and image depth similar to those planned for the co-pointing acquisition image. We provide

- **We need a README File (ASCII format preferred)**

Observing strategy (e.g. N exp of exp-time T, in X filter)

Observing constraints. + Peculiar auxiliary observations

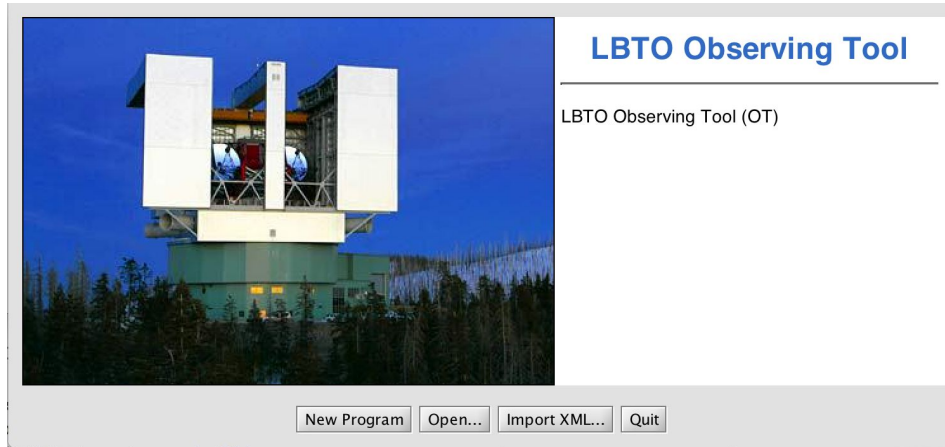
LBTO Observing Tool (OT)



<https://scienceops.lbto.org/script-preparation/ot-installation/>

- OT is based on Gemini Observatory's tool
- **Observation Preparation:**
define targets, guide stars, telescope sequences, science exposures, and calibrations.
- **Calibration Support:**
Calibration scripts are available for all supported instruments.
- **Program Submission:**
After completion, export the Science Program then send them to Partner Coordinators.
- It is **not necessary to generate the scripts yourself**. The observing support team will review the setup and generate the final scripts.

LBTO Observing Tool (OT)



- **Support & Contacts:**

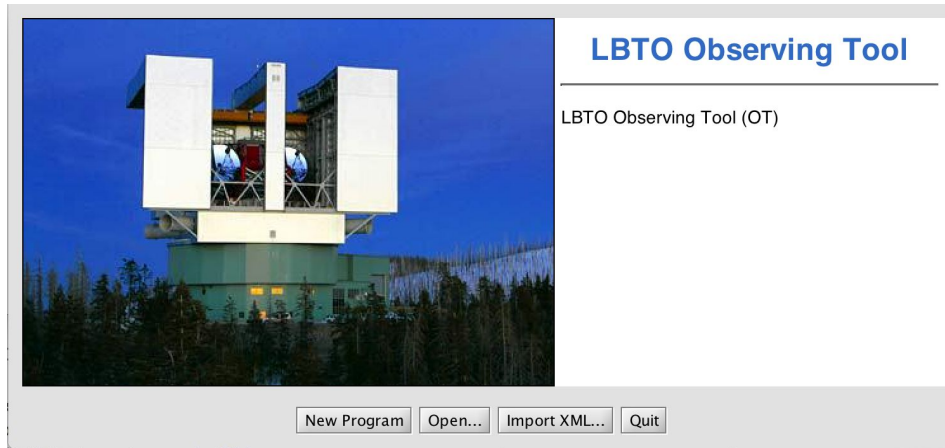
LBTO staff and local Partner Coordinators are the primary contacts

- **version OT 2025B 1.0.0 BACKWARDS COMPATIBLE**

NOTE: OT 2025B will SUPERSEDE ALL PRIOR VERSIONS. OLDER VERSIONS WILL BE DEPRECATED

<https://scienceops.lbto.org/script-preparation/ot-installation/>

LBTO Observing Tool (OT)



<https://scienceops.lbto.org/script-preparation/ot-installation/>

OT Libraries :

Starting point for any configuration and observing sequence. They can (indeed, must!) be **copied and pasted** into your science program.

<https://scienceops.lbto.org/script-preparation/ot-libraries/>

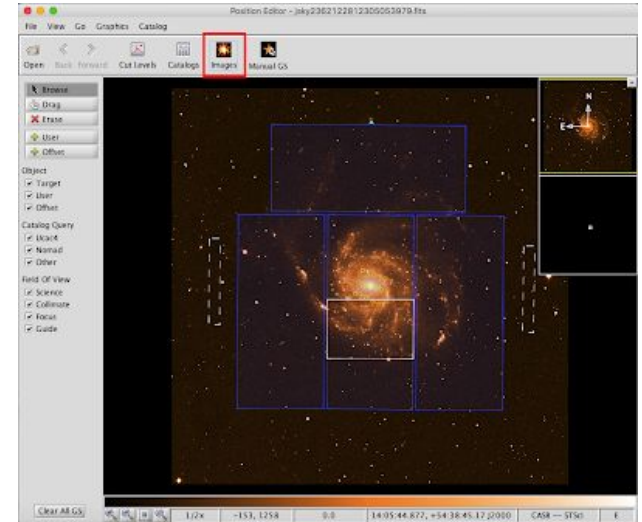
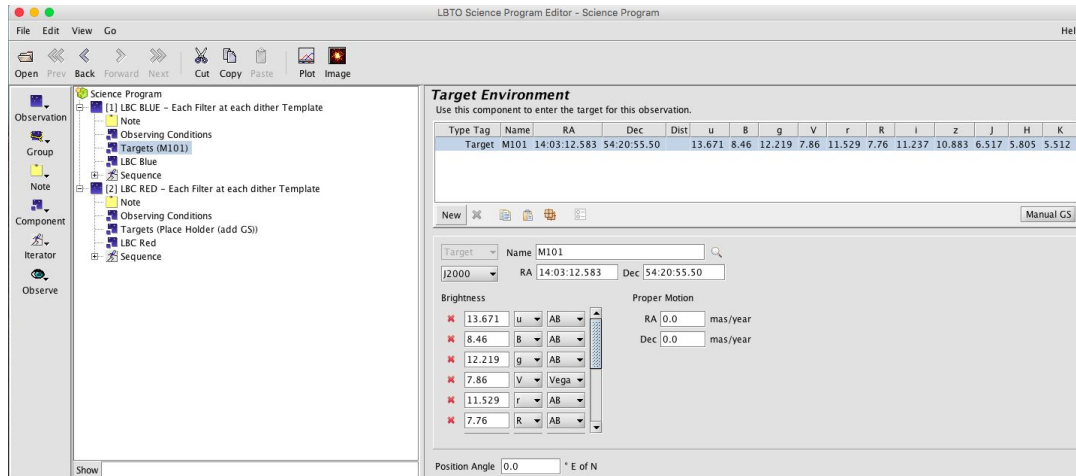
1. [LBT-LBC-Library](#)
2. [LBT-MODS-Library](#)
3. [LBT-LUCI-SL-Library](#)
4. [LUCI-AO-ESM-ADI-Library](#)
5. [LBT-MixedMode-Library](#)

LBTO Observing Tool (OT)

- Examples and templates are in the libraries:

<https://scienceops.lbto.org/script-preparation/ot-examples/lbc-ot-examples/>

- Important steps for setting up an Observation using Library Templates



LBTO Observing Tool (OT)

- Examples and templates are in the libraries:

<https://scienceops.lbto.org/script-preparation/ot-examples/lbc-ot-examples/>

- Important steps for setting up an Observation using Library Templates
- They differ for each instrument **LBC MODS LUCI**
- **LBT is binocular, but we can “forget” this in most cases**
- Auxiliary scripts and calibrations, different for **LBC MODS LUCI**

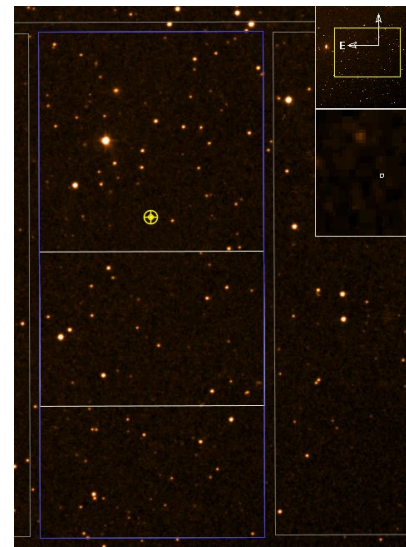
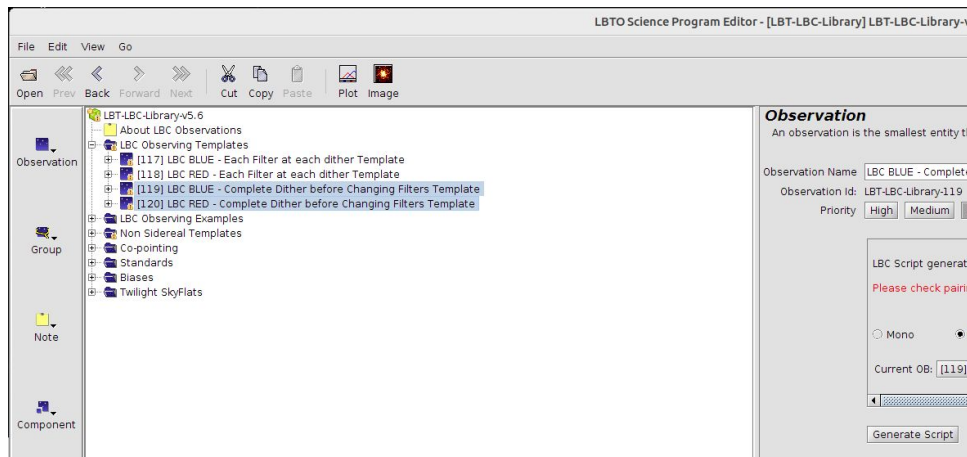
LBTO Observing Tool (OT)

Example 1: LBC Science Observation

<https://scienceops.lbto.org/script-preparation/ot-examples/lbc-ot-examples/>

... but work with these from the library if you plan doing more than 30min total exposure per filter:

...And do not forget to grab a screenshot of the copoint (see example), the only finding chart needed for LBC observation

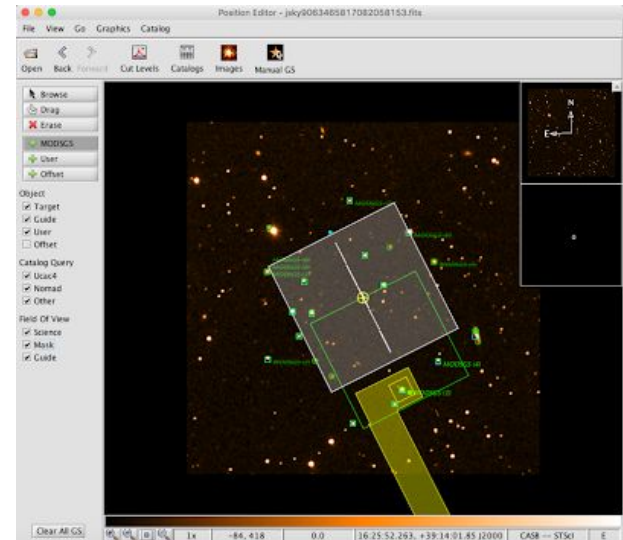
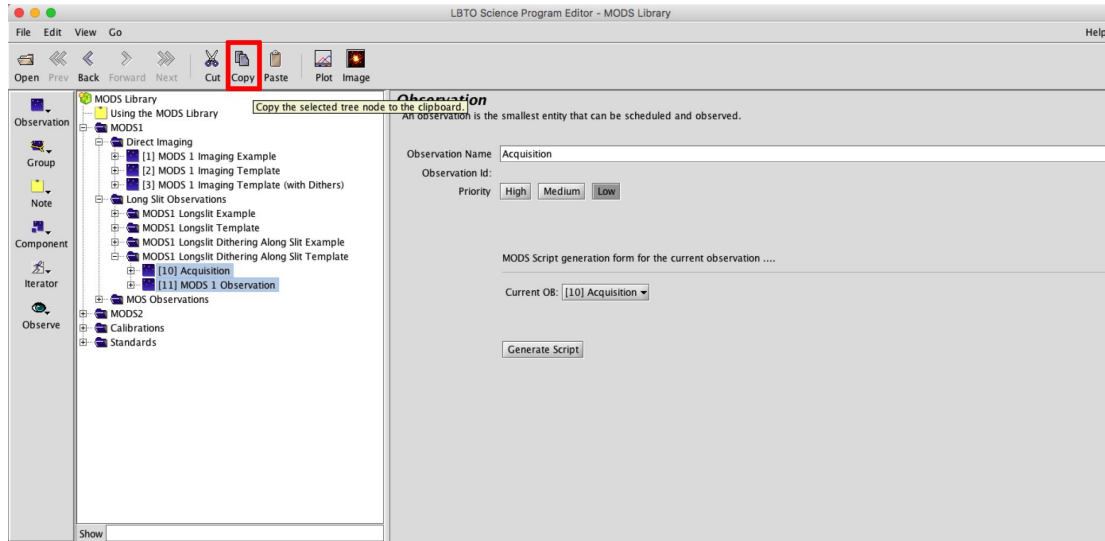


LBTO Observing Tool (OT)

Example 2: MODS Long-Slit Observation

<https://scienceops.lbto.org/script-preparation/ot-examples/mods-ot-examples/2-long-slit-example/>

Copy these from the library:

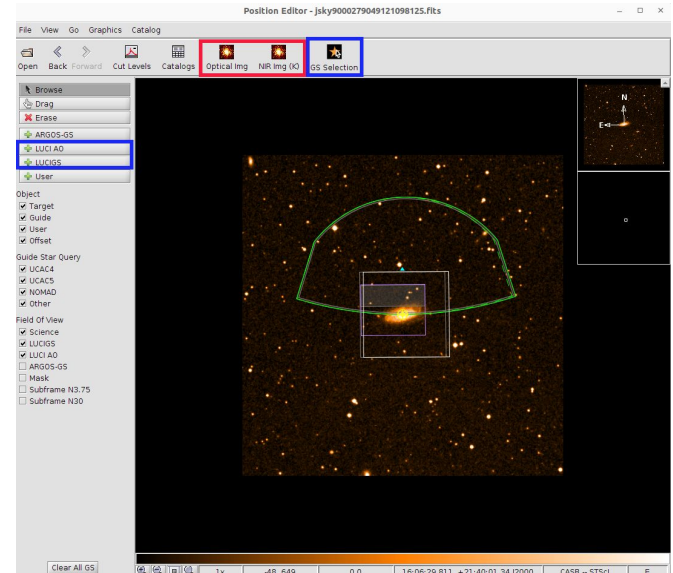
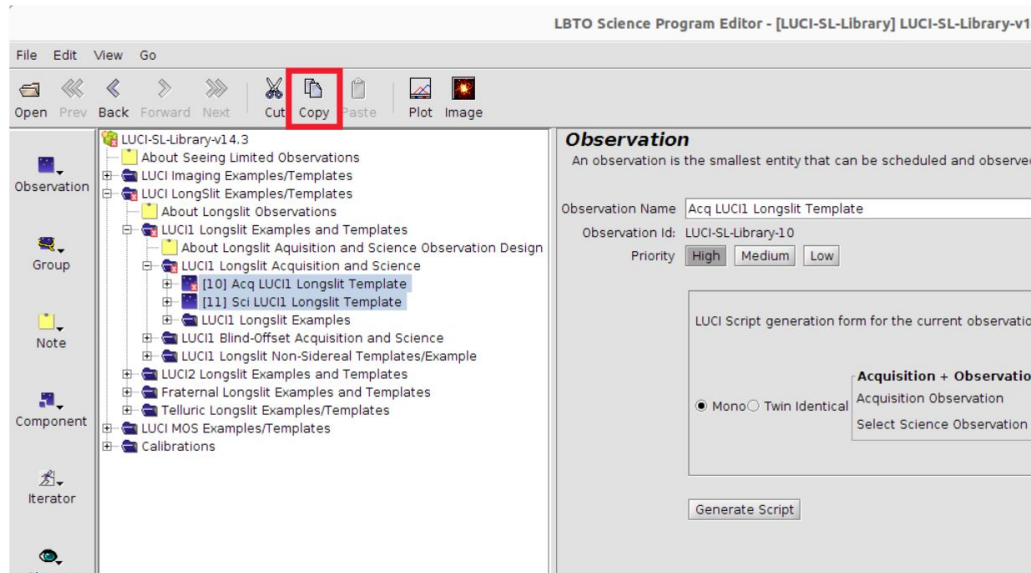


LBTO Observing Tool (OT)

Example 3: LUCI Long-Slit Observation

<https://scienceops.lbto.org/script-preparation/ot-examples/luci-ot-examples/2-long-slit-example/>

Copy these from the library (we will remind you about the telluric, too):

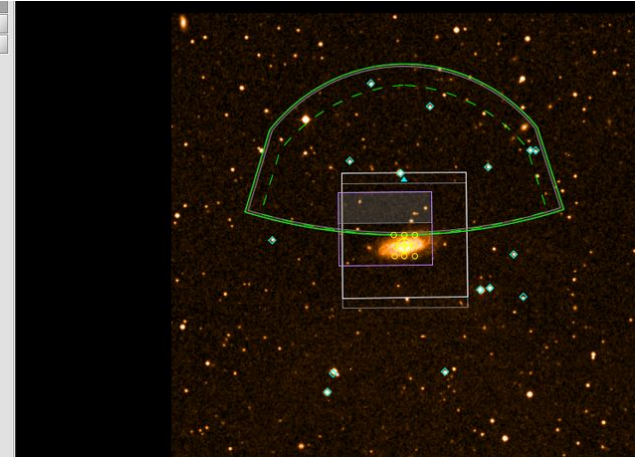
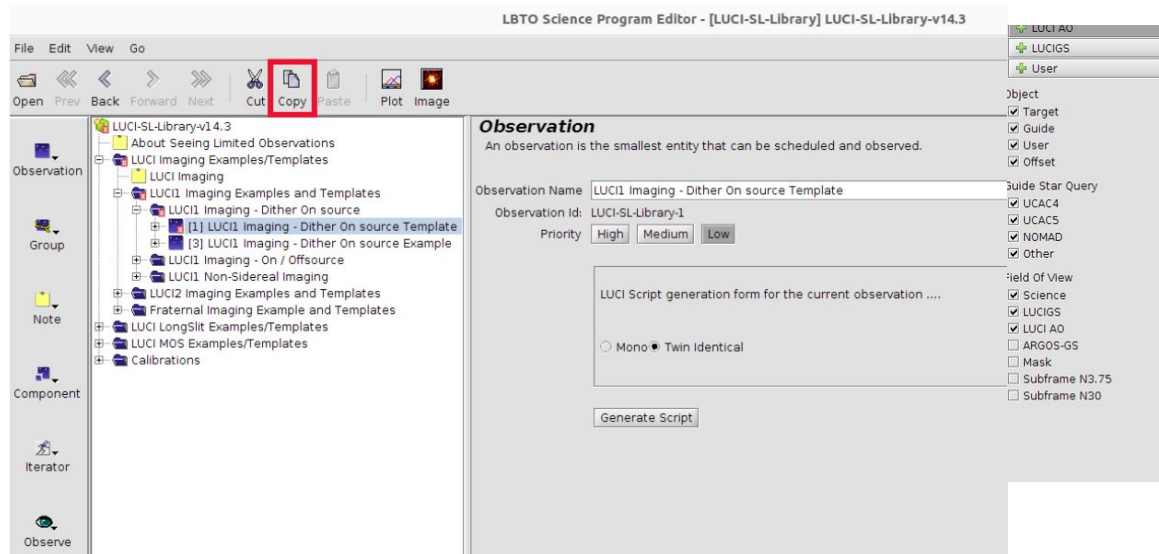


LBTO Observing Tool (OT)

Example 3: LUCI Imaging Observation

<https://scienceops.lbto.org/script-preparation/ot-examples/luci-ot-examples/1-imaging-example/>

Copy these from the library:



Useful links

- Here you can find the schedule (how the period is divided between partners):

<https://www.lbto.org/for-astronomers/> and click on the **observing schedule**

- You can find informations about the single instruments in the **science operation** pages:

<https://scienceops.lbto.org/instruments/> (including ETCs and other details)

- MODS useful tools, including those to check for Atmospheric Dispersion

<https://cgi.astronomy.osu.edu/MODS/ObsTools/obstools.html>