

MAKING OBSERVATIONS WITH GTC/MEGARA EASIER: THE MEGARA OBSERVING PREPARATION SOFTWARE SUITE

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MEGARA (Multi-Espectrógrafo en GTC de Alta Resolución para Astronomía) is an optical Integral-Field Unit (IFU) and Multi-Object Spectrograph (MOS) designed for the GTC 10.4 m telescope in La Palma. Its relatively complex layout makes necessary a set of tools to facilitate the observation preparation to the user. The MEGARA Observing Preparation Software Suite (MOPSS) consists on three software components designed to assist observers to optimally plan their observations with GTC/MEGARA: the Exposure Time Calculator, the Image Simulator, and the Fiber MOS Positioning tool. We describe these software tools and the status of their prototypes up to the date.

MEGARA will offer two different IFU fiber bundles, one covering 14×12 arcsec² (Large Compact Bundle; LCB) and another covering 10×8 arcsec² (Small Compact Bundle; SCB), with different projected fiber sizes. The MOS consists on a total of 100 additional mini-bundles with 7 fibers each that will be positioned by robotic actuators in a region 3.5×3.5 arcmin² in size around the central IFUs.

The MEGARA Exposure Time Calculator is a tool intended to simulate the signal-to-noise (S/N) ratios that will be obtained for the continuum and a spectral line of a target for a given exposure time, MEGARA setup, and night atmospheric conditions (see Figure 1). The limiting magnitudes of MEGARA for continuum in point sources at high, medium, and low resolutions are $V = 24.0$, 24.3 , and 24.6 mag respectively in the whole wavelength ranges covered by B , V , and R bands, for $S/N=5$ per spaxel in 1 h of exposure time. Limiting line fluxes of 2.8×10^{-19} , 3.0×10^{-19} , and 2.7×10^{-19} c.g.s. units can be achieved at $S/N=5$ per spaxel at the center of the R band at high, medium, and low resolutions respectively, for 1 h of exposure time.

The MEGARA Image Simulator simulates data frames of any ideal 3D datacube of a source as it

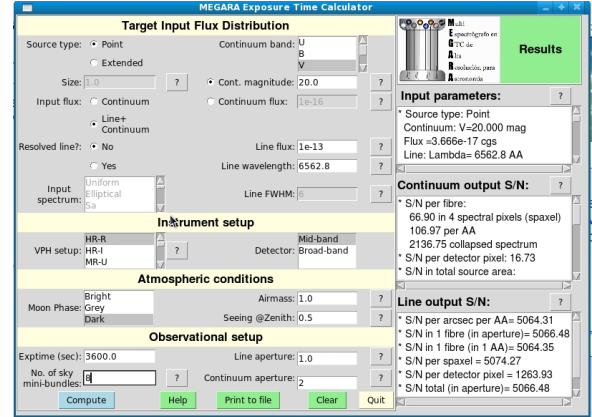


Fig. 1. Graphical user interface of the MEGARA Exposure Time Calculator prototype.

would be observed by GTC/MEGARA for a given setup. The current Simulator prototype returns a MEGARA frame in fits format with the simulated spectra corresponding to the projection of each spaxel on the detector plane including the expected sky contribution and the geometrical distortion, as well as its row stacked spectra frame. Future versions shall simulate some effects inherent to the observation (such as bias, flat-field, non-linear dispersion, crosstalk, and differential atmospheric refraction).

The Fiber MOS Positioning tool shall determine the optimal assignment of actuators for an input list of source coordinates in the 3.5×3.5 arcmin² to cover as many sources as possible, as well as estimate the movements to be done by the actuators to avoid collisions among adjacent ones, minimizing the time to configure them at the same time.

More information on MEGARA available at: <https://dl183.dinaserwer.com/megara/>

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