BlueMUSE Exposure time Calculator - widgets version – Quick start

The BlueMUSE ETC is a very simplified tool to compute performance of BlueMUSE observations in terms of Signal-to-Noise Ratio (SNR). The two main calculations allowed with the public GUI are:

- expected SNR as a function of Exposure Time and wavelength
- Exposure Time required to reach a given SNR at a given wavelength.

The BlueMUSE ETC also gives the possibility to compare with MUSE observations of the same source. It has been validated against the latest version of the ESO MUSE ETC.

Access

Calculations are performed on a server running in Lyon, accessible with this web application: https://calc-bluemuse.univ-lyon1.fr/ (no login required).
Note: it has been mainly tested with Chrome web browsers.

Instrument tab

This tab allows the user to switch between MUSE and BlueMUSE instrument as well as vary some instrument parameter (slit width and end-to-end transmission on the blue side – **only used for specific system-level tests**).
default instrument and parameters in this tab are the baseline of BlueMUSE (0.3"-width slit)
The user can also choose to perform calculations with MUSE (**in that case the slit width should be 0.2"**).

Source tab

This tab allows the user to change the parameters of the input astrophysical source. The choice is between **(changing the source type):**
- Constant continuum flux: the units of « flux » are understood as a constant fixed f_λ (in 10^{-18} erg/s/cm^2/Å)
- Pure emission line (no continuum) : the units of « flux » are then understood as the total integrated flux (in 10^{-18} erg/s/cm^2). The user can select the central wavelength and line width for the emission line.
- User spectrum (the user can then click on « Spectrum upload » to submit an ASCII file containing 2 columns: wavelength in Å and f_λ in erg/s/cm^2/Å

2 spatial distributions are available: "point source" or "extended". In case of an "extended" source, the flux distribution is an infinite, constant surface brightness and all "flux" units are considered as **per arcsec^2 for any of the source type.**

In the example below, the user has selected an extended emission line with a total surface brightness of 3. 10^{-19} erg/s/cm^2/arcsec^2 and a line width of 3.5 Å centered at 4568 Å.

Conditions tab

This tab allows the user to change the simplified atmospheric conditions: seeing, moon illumination (two choices available between "grey" and "dark"), airmass.

Calculation tab

This tab allows the user to define the parameters used in computing the SNR or exposure time.

- nx, ny, nspec define the number of pixels over which the signal is integrated around the source to compute the SNR: along the slices, across the slices, along the wavelength direction.
- "Ref. Wavelength" defines the reference wavelength in Å to compute the reference exposure time or SNR. In case of a pure emission line this wavelength should be exactly or very close to the emission line wavelength.
- "Target SNR" selects the required SNR at the reference wavelength to estimate the exposure time
- "Exposure time" defines the exposure time (in seconds) to estimate the SNR at the reference wavelength

Computation and Output

The user can then choose between Exptime (SNR) or SNR (Exptime) by clicking on the corresponding button widget.

- Exptime (SNR):

The output calculation is the required exposure time (in seconds) necessary to reach the target SNR at the reference wavelength. The plot shows, for this exposure time, the variation of SNR as a function of wavelength.

- SNR (Exptime):

The output calculation is the SNR achieved at the reference wavelength for the selected exposure time. The plot shows, for this exposure time, the variation of SNR as a function of wavelength.