

Plugin VEGA Starlist Editor User Manual

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1. Pivot – Phase 2 - 2.1 Starlist Settings

The phase 2 of Pivot and more precisely the panel ‘2.1 Starlist Settings’ has been modified.

The screenshot displays the '2.1 Starlist Settings' panel in the Pivot software. At the top, a navigation bar contains several tabs: 'Exit', 'Plugins' (highlighted with a red box and the number '2'), 'VEGA Starlist Editor (v1.3.6)', 'P2.1 : Starlist Settings', 'P2.2 : Strategy Settings', 'P3.1 : Run Management', and 'P3.2 : Night Management'. Below the navigation bar is a table with the following columns: 'Type', 'Name', 'HD', 'CHARA', 'VEGA', 'Record', and 'Instru IR'. The table is currently empty. Below the table, there are several controls: a 'Period' dropdown menu set to '1-(S1/2011)', a 'Choose active proposal' dropdown menu, and buttons for 'Import file', 'Export file', 'From DB', and 'Sent proposal to Aspro2'. On the right side, there is a section labeled '[My starlist]' with buttons for 'Associate to this starlist', 'Remove from this starlist', and 'Delete current starlist', and a large empty text area for comments. The 'Edit Starlist' button is highlighted with a red box and the number '1'. The bottom status bar shows 'Lambda Job -- logged as astronomer' and 'comments'.

As you can see above, a button for edit starlist (point 1) was added. This button launches the plugin named VEGA Starlist Editor.

A menu Plugins (point 2) which lists all plugins loaded in Pivot was also added. This list allows also launching plugins. So, the plugin VEGA Starlist Editor can be launched also by a click on it in this list.

2. Plugin VEGA Starlist Editor

Below the plugin VEGA Starlist Editor which allows changing configuration parameters of starlist selected in Phase 2.1, and compute SNR.

Starlist Information 1

STL_P364 **1.1** **1.2** OB HD142860E2E1W2 (TARGET)

Baseline Configuration 2

	T1	T2	T3	T4
Telescope	E2	E1	W2	OFF
POP	POP2	POP1	POP5	OFF
BEAM	V2	V1	V3	OFF

Star Information 3

Name: gam Ser

Magnitude V: 3.85

Angular diameter (mas): 1.0 **3.1**

Base max (m): **3.2**

Spectral Configuration 4

Grating Mechanism: 300 tr/nm Polarization: OFF

Lambda (nm): 720.0 **4.1** Tracking: R

Camera: Red Record: R

Slit: W070H4 **4.2** Default Configuration

SNR Calculation Parameters 5

Seeing: Average

Red neutral density: OPEN

5.1 Photons Number: 3570

Blue neutral density: CLOSE

5.2 Photons Number: 0

Data Recording Parameters 6

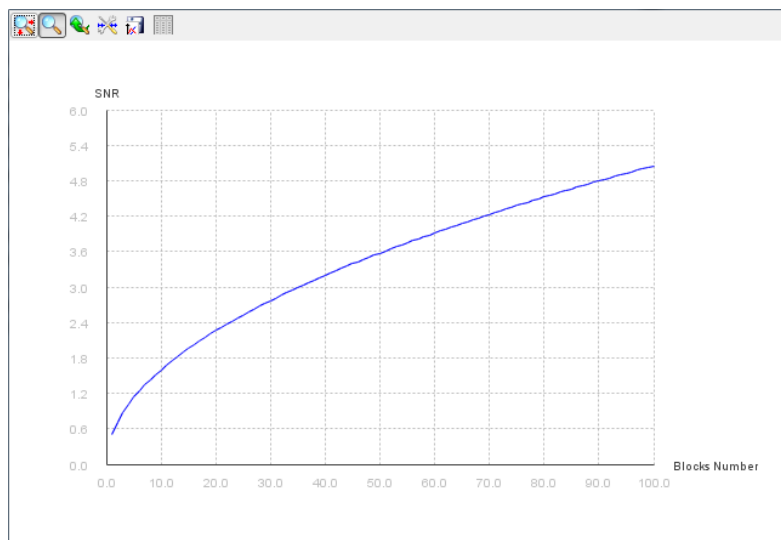
Frame Number: 1000 Block Number: 80 **6.1**

Compute SNR **7**

Save **8**

Quit **9**

1. Starlist information
 - 1.1.Name of starlist selected (starlist to edit)
 - 1.2.OB selected in the starlist
2. Baseline configuration
3. Star information
 - 3.1.Angular diameter in millisecond of arc (Type: double; Value: between 0 and 50)
 - 3.2.Base maximum in meters (Type: double; Value: between 0 and 330)
4. Spectral configuration
 - 4.1.The wavelength (λ) in nano-meters (Type: double; Value: between 400 and 900)
 - 4.2.Allows to reset the default spectral configuration
5. SNR calculation parameters
 - 5.1.The photons number for red neutral density
 - 5.2.The photons number for blue neutral density
6. Data recording parameters
 - 6.1.The blocks number (Type: integer; Value: between 0 and 100)
7. Displays a SNR plot as a function of blocks number (allows to determine the number of blocks for the starlist [6.1]).



8. Allows to update the starlist selected (if the spectral configuration has been modified, all OB would be modified too; or else only the selected OB would be modified) in Pivot database
9. Allows to quit and close the plugin

3. Use of plugin in Pivot

In PIVOT, after the starlist has been loaded, click on button 'Edit Starlist' to verify the settings and fix the number of blocks for the data recording (using the SNR calculator) and if possible update the angular diameter information. Click on 'Save' when done with modifications.

Annexes

Constant used to calculate the V_{target}

$$c = 15.23$$

V_{target} Formula

$$z = c * \frac{(baseMax * angularDiameter)}{lambda}$$
$$V_{target} = \left| \frac{2 * Bessel.j1(z)}{z} \right|$$

Constants used to calculate the SNR

$$charaTransmission = 0.03$$

$$gratingTransmission = 0.6$$

$$mirrorTransmission = 0.9^{13}$$

$$slitTransmission = 0.3$$

$$detectorQuantumEff = 0.2$$

$$telescopesDiameter = 1.0 \quad (\text{m})$$

$$exposureTime = 15 * 10^{-3} \quad (\text{ms})$$

$$instrumentalVisibility = 1.0$$

$$h = 6.62606896 * 10^{-34}$$

$$c = 299790000.0$$

$$phi0 = 1.76 * 10^{-8}$$

Photons Number Formula

$instrumentalTransmission = mirrorTransmission * gratingTransmission * slitTransmission$

$globalTransmission = charaTransmission * instrumentalTransmission$

$X = telescopesNumber * globalTransmission * detectorQuantumEff * 4.0 * \pi * \left(\frac{telescopesDiameter}{2.0}\right)^2$

$Y = (deltaLambda * 10^{-3} * exposureTime * 10^{-0.4*magnitude} * phi0 * (lambda * 10^{-9}))$

```
if (redNeutralDensity = CLOSE) density = 0.0
if (redNeutralDensity = 0.3) density = 10-0.3
if (redNeutralDensity = 0.6) density = 10-0.6
if (redNeutralDensity = 1.0) density = 10-1.0
if (redNeutralDensity = 1.5) density = 10-1.5
if (redNeutralDensity = 2.0) density = 10-2.0
if (redNeutralDensity = OPEN) density = 1.0
```

$photonsNumber = \left(\frac{X * Y}{h * c}\right) * density$

SNR Formula

```
if (photonsNumber = 0) snr = 0.0
else {
    
$$c1 = \left( \frac{\text{photonsNumber}}{\text{telescopesNumber}} \right)^2 * \left( \frac{\text{instrumentalVisibility}}{\text{seeingFactor}} \right)^2 * V_{\text{target}}^2$$

    
$$\text{var\_v2} = 2 * \text{photonsNumber} * c1 + \text{photonsNumber}^2 + c1^2$$

    
$$\text{snr} = \frac{c1}{\sqrt{\text{var\_v2}}} * \sqrt{\text{imagesNumber}}$$

}
```