



TNG: The SARG derotator interface
R. Cosentino, P. Bruno

TNG: The Sarg derotator interface
Roque de Los Muchachos, November 2001

R. Cosentino, P. Bruno

Document available at: <http://www.tng.iac.es>



1 The SARG derotation Interface

The derotation of the field in SARG is obtained through an *Abbe-König* inverting prism, mounted in a rotating wheel. The image of the 'derotated field' goes into the spectrograph and is visualised by the slit viewer camera (SV).

When "SARG DEROTATOR" interface is started, the panel of **Figure 1** will appear to the user. In this panel some information about the status of the derotation is shown and some actions are permitted.

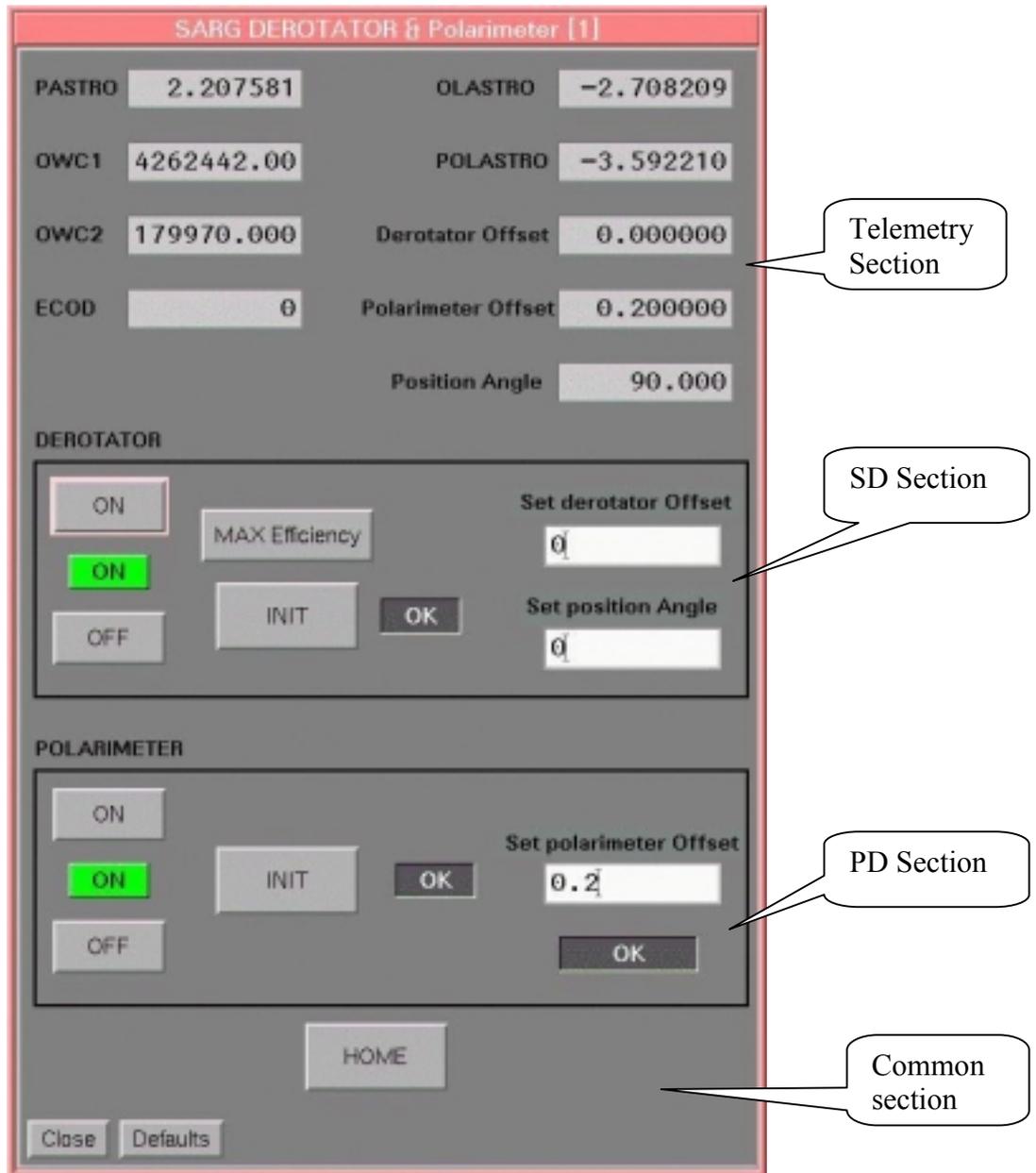


Figure 1 : Sarg derotator user interface

In the **Figure 1** three sections are shown: At the top a telemetry section, in the middle the SARG Derotator (SD) section and Polarimeter Derotator (PD) section and at the bottom a home command (common to SD and PD sections)

- INIT Initialise the SD/PD wheel
- Derotation ON/OFF activate/deactivate the derotation (need the initialisation)
- Set derotator Offset rotate the slit angle (radians)
- Set polarimeter offset rotate the PD to a defined angle (radians)
- Max Efficiency set the offset angle at maximum efficiency position (see Figure 3)
- Set position Angle set the position angle of the slit
- PASTRO visualize the PAASTRO angle (radians)
- OLASTRO visualize the OLASTRO angle (radians)
- OWC1 visualize the increments from reference of the SD wheel (range 0 – 8424825 increments)
- OWC2 visualize the increments from reference of the PD wheel (0 - 360000)
- POLASTRO visualize the POLASTRO angle (radians)
- Derotator Offset visualize the current SD offset (radians)
- Polarimeter Offset visualize the current PD offset (radians)
- Position Angle visualize the current position angle (degrees)
- ECOD visualize error code from low control software
- HOME move both wheels at home position

*Note : The PAASTRO angle is the astrometric-calculated angle of derotator
The OLASTRO and POLASTRO angles are the current position of optical and polarimeter derotators.*

The activation of the SARG derotator/polarimeter must be done after the synchronisation of the tracking (gate initialisation, in the tracking interface).

The steps are the following:

1. Wait until the end of the telescope initialisation
2. Initialise with the INIT button and wait until the end of the initialisation. (look at the user interface until the *wait* button turns at the *ok* position)).
3. Now the derotation can be activated / deactivated.

NOTE:

- *The INIT and HOME commands only work if the SD and PD are in the OFF position.*
- *The Max Efficiency command and the offsets settings only work if the SD is in the ON position*
- *The optical derotator works in the OWC1 range 200.000 - 8324825. Close to the limits the operator has to :*
- *Turn off the SD (OFF button section 2);*
- *Go to home position (HOME button of common section);*
- *Activate the SD (ON button of section 3).*

The DOFSET angle represents the angle between the top of visualized image and the North, the slit has a left-right orientation (Figure 2).

For this reason to position the slit at a position angle is: Derotator offset = $\pi/2$ - position angle

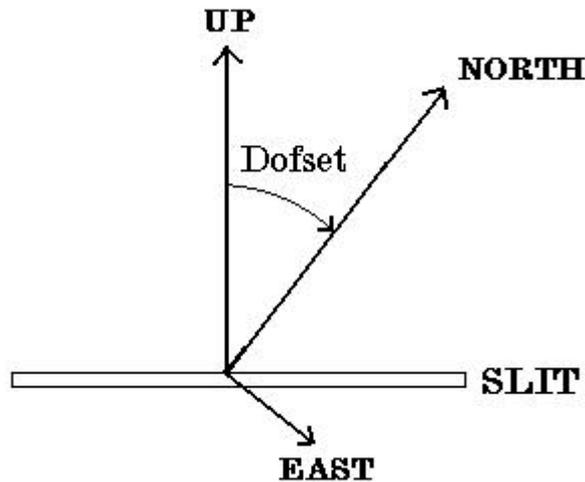


Figure 2 : Slit viewer angle

The efficiency of the spectrograph, due to a slight misalignment of the prism, depends on the wheel position.

The maximum efficiency is at 5000000 increments from home position (Figure 3). For this reason if you need the maximum efficiency, and aren't interested in the orientation of the slit, you may choose the fixed position of the wheel and guide with the auto-guide.

To set the maximum efficiency position, you must do the following steps:

1. Push the **maximum efficiency** button (when the derotation is active)
2. Wait until the wheel ends the movement (OWC1 assumes a value near 5000000 increments and DOFSET assumes a value corresponding to this wheel position)
3. Deactivate the derotation

To relocate the derotator at standard position (north on the top):

1. Move the derotator to home position (HOME button of common section);
2. Set a zero angle in derotator offset;
3. Reactivate the derotation;

2 The Polarimeter Derotator

2.1 Polarimeter derotator description

The polarimeter derotator, if activated, turns the polarimeter in order to maintain the correct sky-angle in the slit viewer camera. Due to mechanic design, the PD works in the OWC2 range 1000 – 355000 increments. When the PD position is out of range, the derotation is stopped automatically and an error appeared in the interface (error 12 – position not allowed).

In case of error 12 the operator has to put an angle of 3.14 radians in 'set polarimeter offset' and waits until the error disappears.

The polarimeter consists of rotating $\lambda/2$ and $\lambda/4$ retarders, selectable with the SARG user interface.

When the $\lambda/4$ retarder is inserted a change in sky orientation in the slit viewer camera occurs.

With $\lambda/4$ a Y axe flip occurs (north on the bottom and east on the right)

With $\lambda/4+90$ a X axe flip occurs (east on the left and north on the top)

With a $\lambda/2$ retarder the orientation of the sky in the slit viewer camera doesn't change (north on the top and east on the right)

2.2 Use of the polarimeter derotator with auto-guide

When you use the polarimeter with the 115000L(ong) resolution slit, you have to select the corresponding slit in the auto-guide program.

This slit has three markers: one in the centre of the slit and two in the polarimeter spots-generated position.

In order to use the polarimeter the operator has to:

1. Centre the star, without polarimeter inserted, in the centre of the slit;
2. Inserts the polarimeter;
3. Put the generated spots in the corresponding marks;
4. Guide.

With a $\lambda/4$ retarder has to flip Y axe in the “*Guiding options*” of autoguider program (the alpha offsets have the sign changed)

With a $\lambda/4+90$ retarder has to flip X axe in the “*Guiding options*” of autoguider program (the delta offsets have the sign changed)

With a $\lambda/2$ retarder has to use the default settings (without flip of axes)

Note: The separation between polarimeter spots is 37 pixels (5 arcsec).

NOTE:

- *The INIT and HOME commands only work if the SD is OFF .*
- *The polarimeter derotator works in the OWC2 range 1000 - 355000. Out to the limits an error 12 appears in the interface and the operator has to:*
 1. *Put an angle of 3.14 radians in ‘set polarimeter offset’;*
 2. *Wait until the error disappears.*

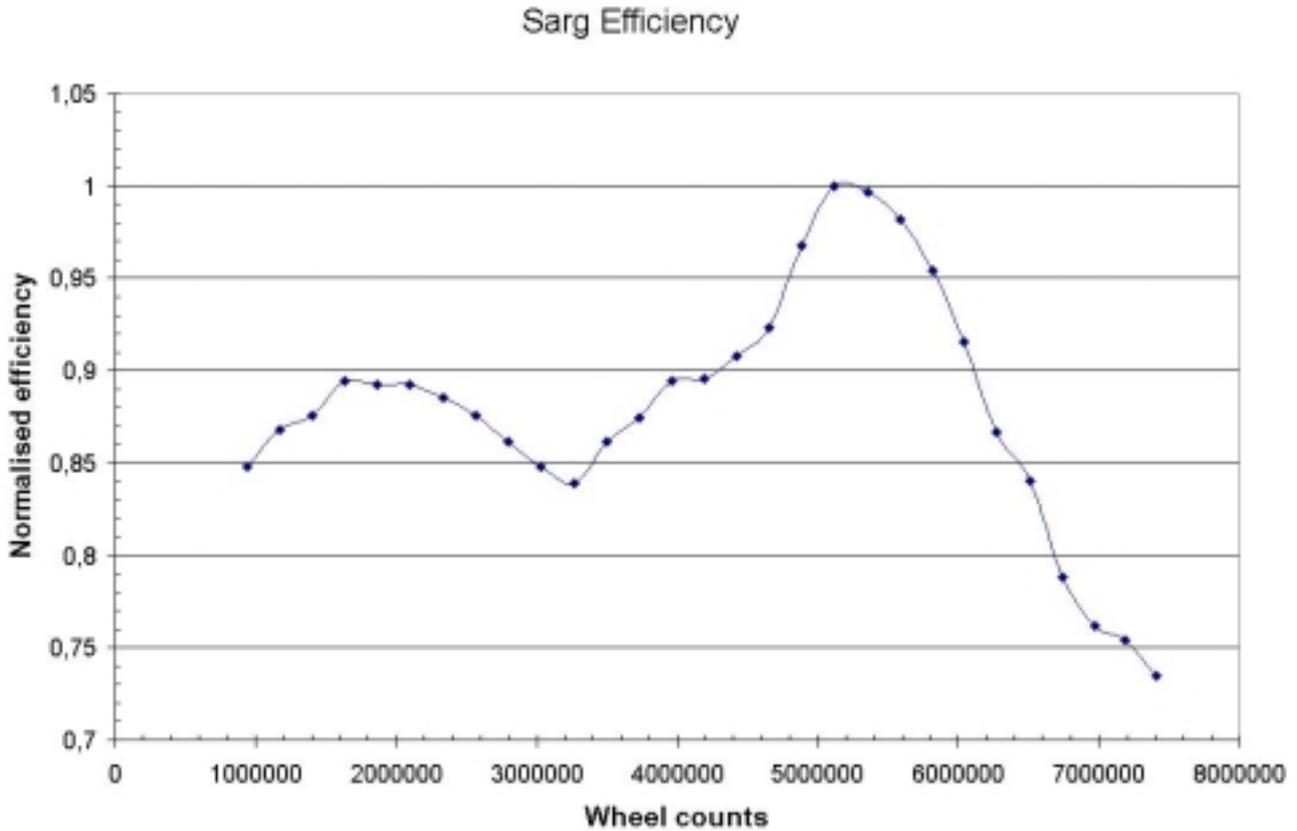


Figure 3 : Sarg efficiency versus wheel position

Error codes (ECOD) from low control software:

- 0 - no error**
- 1 - Axis not connected (probably the wheel controller is OFF)**
- 2 - Position not found (it needs reset controller)**
- 3 - Switch not found (The security button (red button) on the wheel controller can be down)**
- 4 - switch encountered**
- 5 - Error on the opening of the file**
- 6 - Error on closing of the file**
- 7 - File reading error**
- 8 - Not Used**
- 9 - Not Used**
- 10 - Not Used**
- 11 - Not Used**
- 12 - Position not allowed**
- 13 - Not Used**
- 14 - Not Used**
- 15 - Owis lost control**
- 16 - No axis found or controller OFF**
- 17 - Error in parameter value**
- 18 - Polarimeter table out of limit**
- 19 - Polarimeter table lost control. Need init**
- 20 - derotator table lost control. Need init**