

## Quick manual

# Spec INTI Editor V2.x

*SpecINTI editor lets you launch specINTI from a graphical interface. It includes a text editor for editing and saving configuration files, an observation file generator, image fits and spectral profile visualization, and a thumbnail presentation of results in png format.*

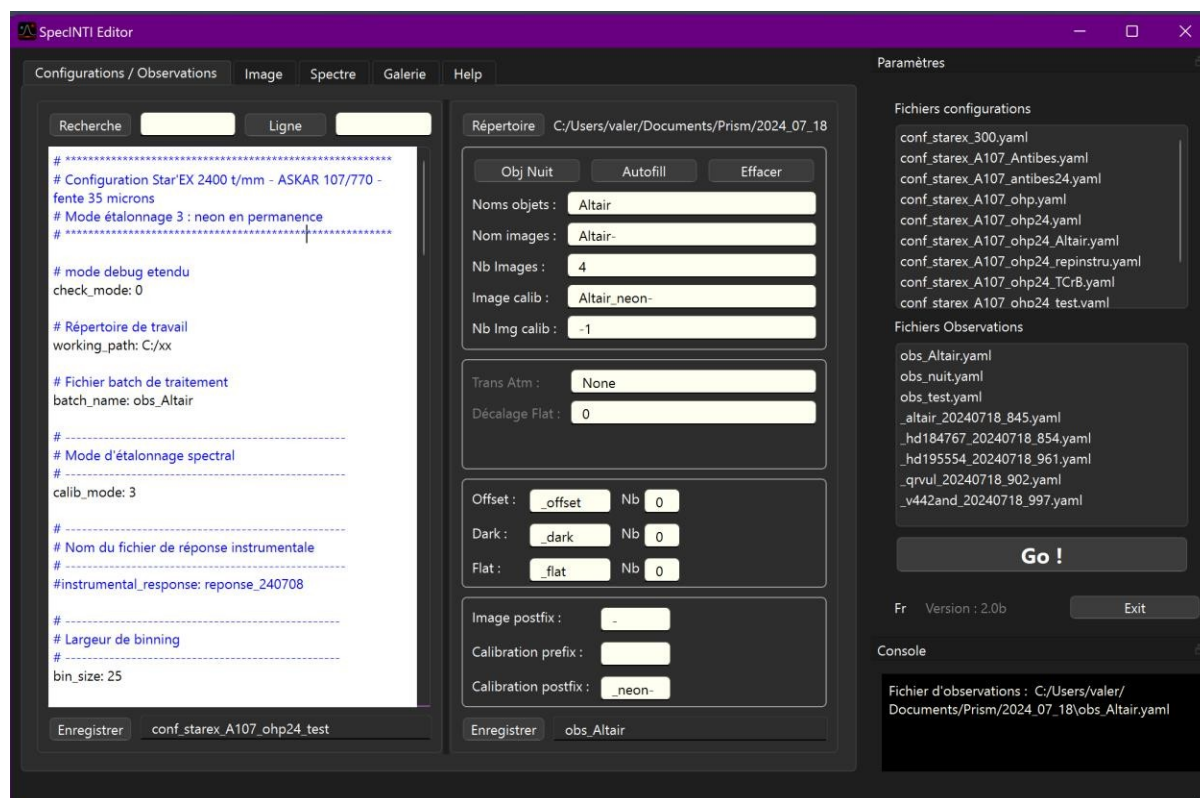
## Installation

Unzip the specinti\_editor file

Copy your \_configuration folder instead of the default \_configuration folder

## General presentation

On launch, the window below appears. It takes the form of a tabbed area and a panel on the right with two blocks (docks): Parameters and Console.



The window can be enlarged. The two docks can be independently enlarged, moved to the left or bottom, or even detached as independent windows. To re-dock floating panels, double-click on their title bar.

The interface style depends on the system interface style. In the case below, Windows11 Dark mode.

The application remembers your interface layout for the next launch.

### Language management

To change the default language from French to English, click on the 'Fr' button, then restart the application.

### Version check

If you have an Internet connection, the application checks the current version number on the web. If the version is different, the version color changes to red.

## Configuration / Observations

The size of the two zones can be adjusted by moving the mouse between the configuration and comments zones.

On the left panel :

- Access to configuration files in the `_configuration` directory for simple text editing.
- Access to observation files if you have entered a directory in the tab comments

### To start processing, click on Go!

The *Go!* button launches the configuration script selected in the Configuration tab.

**Please note:** the "Go!" button saves changes to the Observations file. It is currently not possible to manually modify the name of the observation file in the configuration file; it will automatically be replaced by the current observation file.

If you wish to change the default autosave behavior of the observation file, for example to use an Observations file from another program, you will need to manually edit the `specinti_ini.yaml` file by changing the 'autosave\_obs' parameter from True to False.

The *Exit* button is used to terminate the application, saving the application settings. The behavior is the same if you click in the window's close box.

The console does not display information in real time during processing. They will be displayed once processing is complete.

## Configurations

The `.yaml` configuration file is displayed as text in the area on the right. It is possible to simply edit it. Comments start with a "#".

When the software itself updates certain keywords, their color changes to green.

To save a modified file, simply enter its new name and click on the Click on "Save".

### Configuration tips

You can search for a word in the text of the configuration file using the "Search" button and

the associated text box.

You can also navigate to a specific line number using the "line" button and the associated text box.

## Comments

This section is a wizard for reading and generating an observation file. - The file *yaml* will be saved in the observations directory.

Select the observation directory with the *Browse* button. This is the select a directory, not a file.

The list of files with *.yaml* extension in this directory is displayed on the right.

Please note: SpecINTI generates *.yaml* files that copy the configuration used during processing. These files begin with the prefix "\_" and should not be confused with observation files.

All fields can be edited manually. You can start from an existing file.

The power of the generator lies in the "Auto" function - this automatically fills in the fields, filling in only the list of objects and the names of the offset, dark and flat master images.

To do this, you need to fill in the prefixes and postfixes of your image names.

- Image file postfix : indicates the separating character(s) between the root name and the image number in the sequence. For example "-" for sequences of type "etoile-1 ", "etoile-2 "... "etoile n".
- Calibration file prefix: indicates the character(s) before the root name of the calibration file. For example, "a" for "aetoile-1". This field remains empty if the prefix is not used in your standard.
- Calibration file postfix: indicates the character(s) after the file root name calibration. For example, "\_neon-" for "etoile\_neon-1".

Enter the list of object titles in a Simbad-compatible format.

Example: "EW Lac", "Altair", "HD 6226".

Spaces must be respected. Names should be separated by commas, followed or not by a blank.

Example: Altair, EW Lac, 60 Cyg, omi Cas

Enter the names of the offset, black and flat images WITH their postfixes

Example: "o-", "n300-", "f-".

or

"\_offset", "\_dark", "\_flat"

Master images must be present in the observation directory.

At this point you can click on **"Autofill"** if your file naming standard complies with the convention described. The fields List Images, Number of images per object, List

Calibration, number of calibration images, as well as the number of offset, black and flat images will be automatically filled in. The operations performed are as follows:

- Removes spaces in object identifiers to create the root name with its postfix. For example, "EW Lac" becomes "EWLac-".
- For each object, count the number of images in the object sequence with the root name image.
- Adds prefixes and postfixes to root names to create calibration file names, for each object.
- Counts the number of offset, black and flat images, or retains "0" if only one image is found to be compatible with the specINTI standard. If the number of images is "0", specINTI uses the image name as a master image already generated.

It is therefore important to name the images on acquisition in accordance with this convention, so that the auto-fill function fills in all the fields with a single click.

Example of acquisition names for stars:

gamcas-1, v442and-1, HD192685-1

Example of acquisition names for calibration images :

gamcas\_neon-1, v442and\_neon-1, hd19265\_neon-1

or with a prefix:

agamcas-1, av442and-1, ahd192685-1

Example of automatic filling after manually filling the list of object names (and master images):

Répertoire C:/Users/valer/Documents/Prism/2024\_07\_18

Obj Nuit Autofill Effacer

Noms objets : HD 184767, HD 195554, QR Vul, V442 And

Nom images : HD184767-, HD195554-, QRVul-, V442And-

Nb Images : 6, 5, 5, 6

Image calib : aHD184767-, aHD195554-, aQRVul-, aV442And-

Nb Img calib : -1, -1, -1, -1

Trans Atm : None, None, None, None

Décalage Flat : 0, 0, 0, 0

Offset : \_offset Nb 0

Dark : \_dark Nb 0

Flat : \_flat Nb 0

Image postfix : -

Calibration prefix : a

Calibration postfix : -

Enregistrer obs\_nuit

If you're not using a naming standard, or if you want to change the name(s) or number, you can of course edit each field manually. For example, if an image

If a calibration file has not been created for an object, you can edit it to replace it with the name of another calibration file closest in time.

You can also start from an existing observation file. To do this, click on one of the files in the list on the right. This can be useful for correcting an error or modifying a parameter.

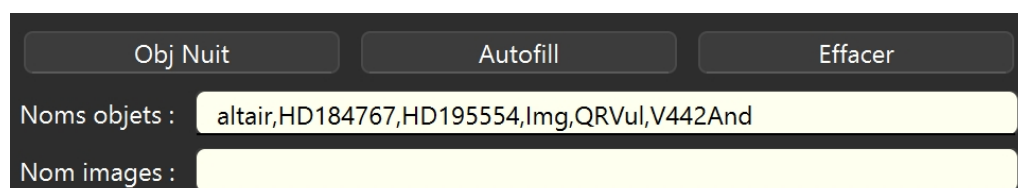
Finish by entering the name of the "observations" file and click Save to save it. It will be automatically saved when you start processing. Be sure to change the name if you have made any modifications.

### Observations tip

If changes are made to any of the fields in the observations section, the profile file name turns red. This indicates that the observations file will be saved with these changes. modifications, if this is not desirable, then change the name, and the name will revert to white.

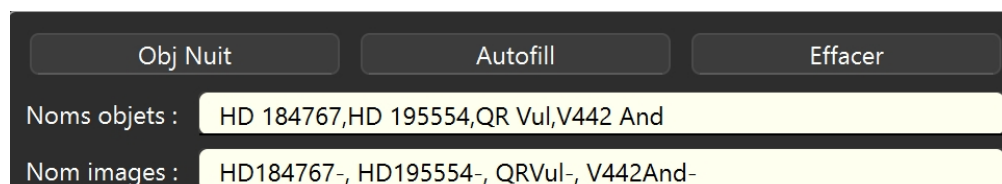
**Obj Nuit** button is an additional tool to help list all night objects. Its algorithm is as follows: identify all file names with sequence number -1 and place these file names in the object list. You then need to do a little tidying up to remove irrelevant file names and add a space so that the object name conforms to Simbad's rules as seen above.

Example on an observation file - the algorithm finds the following names.



The screenshot shows a dark-themed interface with three buttons at the top: 'Obj Nuit', 'Autofill', and 'Effacer'. Below the buttons, there are two text input fields. The first field, labeled 'Noms objets :', contains the text 'altair,HD184767,HD195554,Img,QRVul,V442And'. The second field, labeled 'Nom images :', is empty.

We eliminate altair because it has already been processed, then Img, which was a test image, and we add the blanks to name the simbad objects. Finally, we click on AutoFill.



The screenshot shows the same interface as before, but the 'Noms objets :' field now contains 'HD 184767,HD 195554,QR Vul,V442 And'. The 'Nom images :' field now contains 'HD184767-, HD195554-, QRVul-, V442And-'. The 'Autofill' button is highlighted.

### Advanced mode

- Trans atm file list: list of atmospheric transmission files by object
- Flat offset list: flat offset in pixels for correction by object See specINTI

documentation for their use.

By default, lists are initialized to : None and 0 with their number in the list matching the number of objects.

## GO!

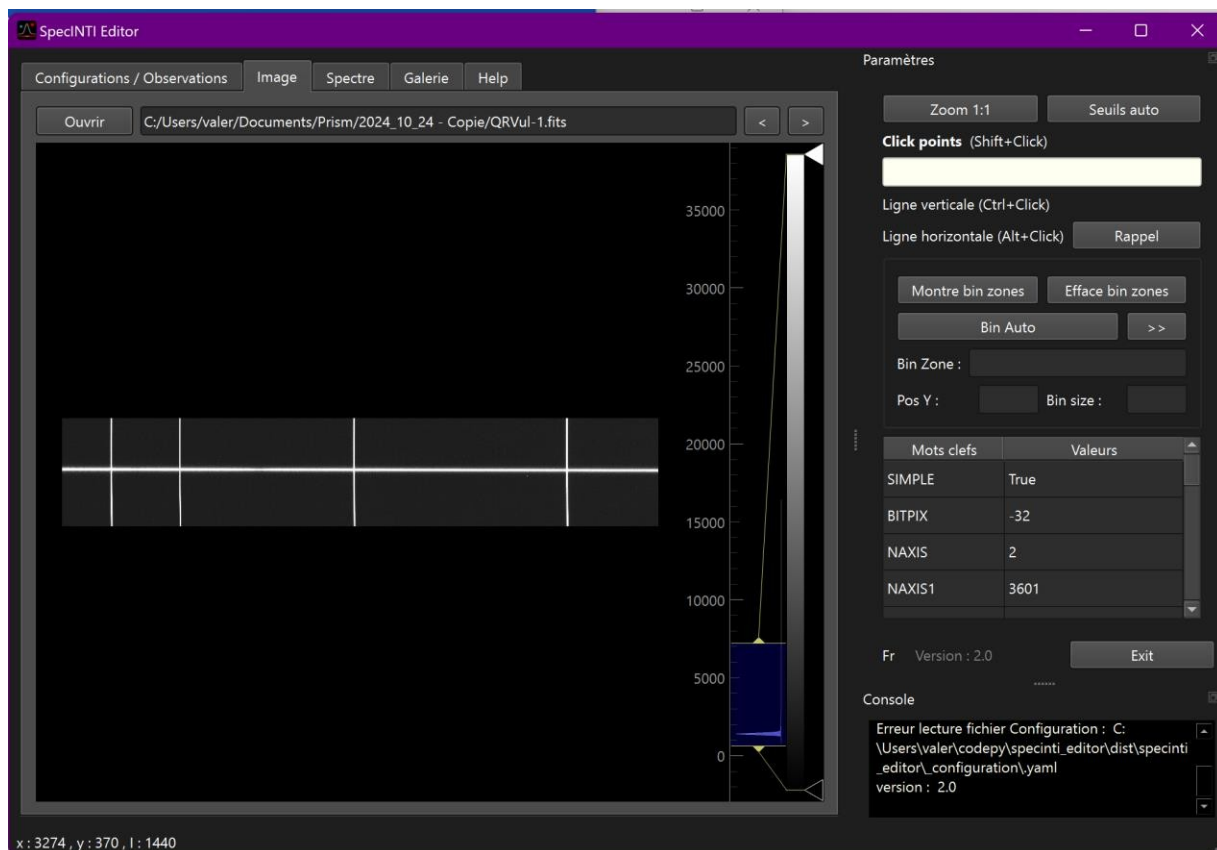
To start processing, click on the GO! button.

The software saves the observation file and the configuration file automatically, under the names indicated in their respective fields.

Console messages are displayed in the small console docked in the bottom right-hand corner. But beware: during processing, the messages will only be displayed at the end of the process... It is therefore advisable to keep access to the application's terminal console, which is sometimes behind the interface, so remember to be able to access it...

## Image

Displays *2D fits*



### Image tips

You can now zoom and move the image with the mouse and its scroll wheel. The "zoom 1:1" buttons force the image to be displayed without zoom factor - if you've zoomed out or moved the image too far in the viewing area, right-click "view all" to bring the image back to center.

Contrast and brightness are controlled by two thresholds, high and low, which can be adjusted with the mouse in the histogram area to the right of the image.

The x,y and intensity values of the pixel are displayed in the bottom left-hand area of the window.

A right mouse click brings up a context menu for the PyQtGraph library, which can be used to example to export the image as a png.

If the image is part of a numbered sequence such as name-1, name-2 ... name-n, if you click on the <> buttons, the next or previous image in the sequence will be automatically displayed.



The image name field can also be edited. To take account of name, confirm with "enter"

Display yellow vertical lines with Ctrl+click (or "command" for Mac) in the image, red horizontal lines with Alt+click (or Option for Mac). To delete them, click again on the line with Ctrl or Alt, depending on the type of line.

Recall the position of the last horizontal line on another image with the "Recall horizontal line" button.

Shift+click records x-positions of spectral lines by moving the mouse over the position. The x-positions are added one after the other in the 'Click Points' text box. This area can be edited.

To copy an entire text zone, press Ctrl+A, then Ctrl+C - you can then go to the configuration tab to paste the line positions behind the appropriate keyword.

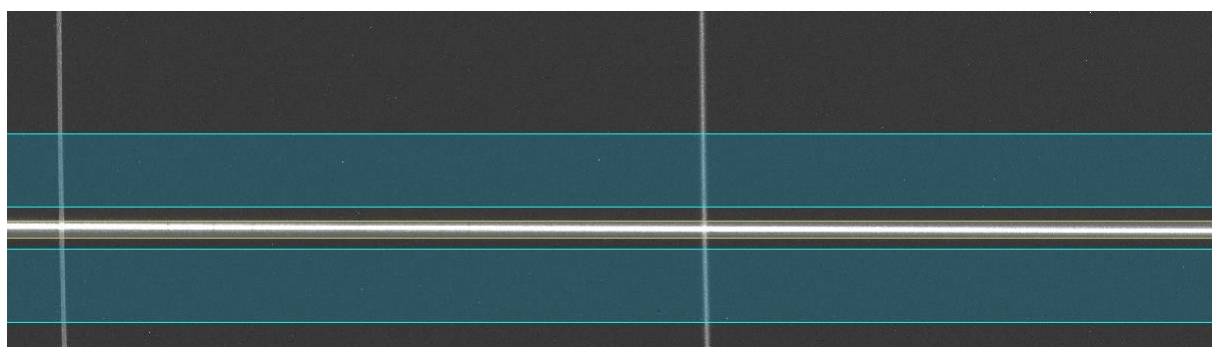
The automatic binning function is now operational. It uses specINTI's internal functions to find the position of the spectrum, possibly straightening the trace to a central zone by calculating the local tilt angle. A complementary algorithm estimates the spectrum boundaries and adjusts the sky binning zones on either side of the binning zone. The 'posY' values of the spectrum trace, the 'bin\_size' binning zone size and the 'bin\_zone' sky binning zone are updated.

The ">>" button transfers the bin\_sky and sky values to the configuration file. The y position of the spectrum is not updated for security reasons.

You can also edit them and graphically check their dimensions and positions using the "show bin zone" button.

These zones can be adjusted with the mouse. The sky binning zones are shown in blue, while the spectrum binning zone is shown in zone. Click on a zone to move it. Move the mouse over one of the lines bordering the zones; this line turns red, then click and drag with the mouse. Values are updated in the corresponding fields.

Click on the Erase bin zone button to remove the display from the image.



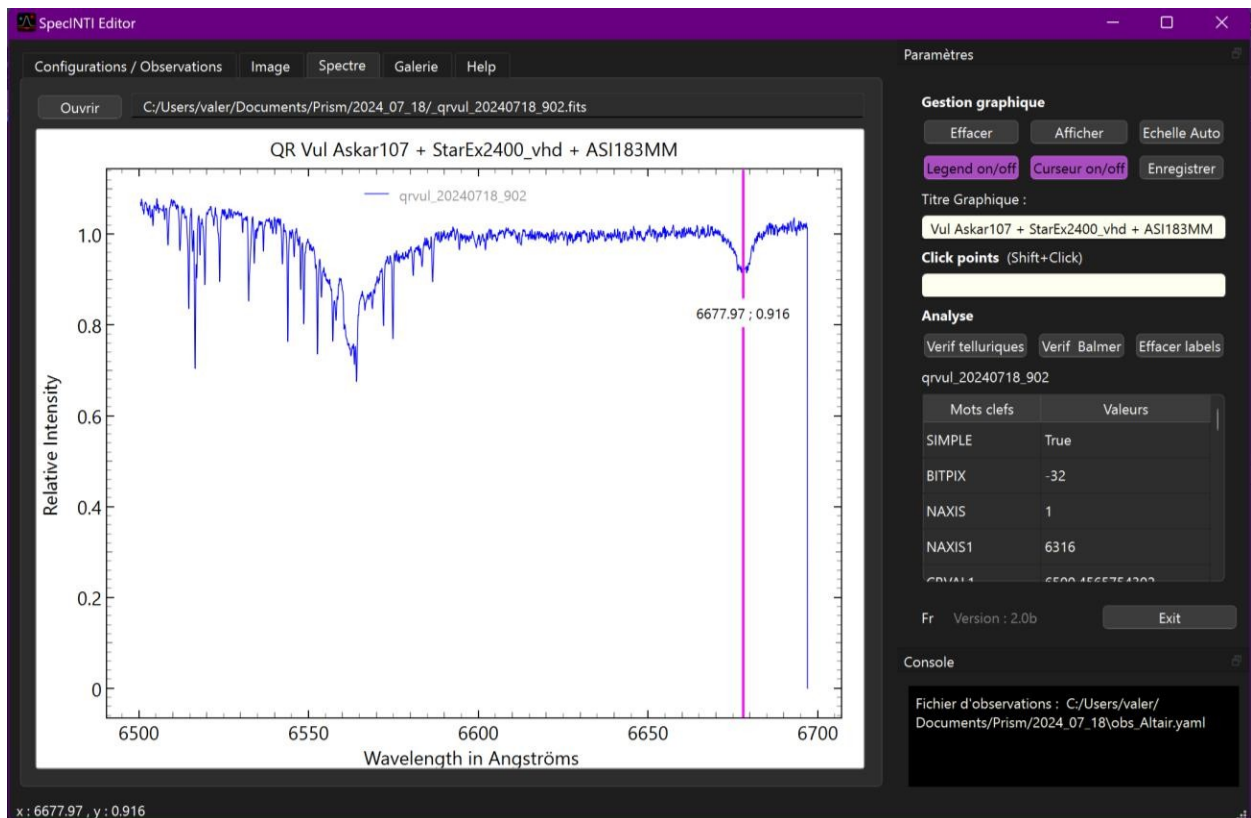
The image file header is displayed but cannot be edited.



## Spectrum

Display spectral profiles, 1D *fits* file Open the *fits* file with the *Open* button.

If a 2D image fits file is selected by mistake, a message will be displayed in the console. The file's *fits* header is also displayed on the right.



## Spectre tips

Use the mouse wheel to zoom in and out.

To zoom in on an axis only, use the right mouse click: move to horizontally for x-axis zooming, and vertically for y-axis zooming.

You can return to automatic scaling at any time by clicking on the "Auto scale" button, or by clicking on the small "A" icon in the bottom left-hand corner of the graph.

The legend and a vertical cursor are displayed by default. They can be hidden using the "legend on/off" and "cursor on/off" buttons.

The legend can be moved with the mouse

The cursor can be moved with the mouse along the profile and displays the length values. wavelength and intensity

When a file is opened, a chart title is formed with the header information. Changes can be made in the text zone. To validate changes, don't forget to press 'enter'.

Right-click in graph area to export to png or axis values

The "Save" button saves the profile under a different name, before you run a new profile. treatment with different parameters for comparison.

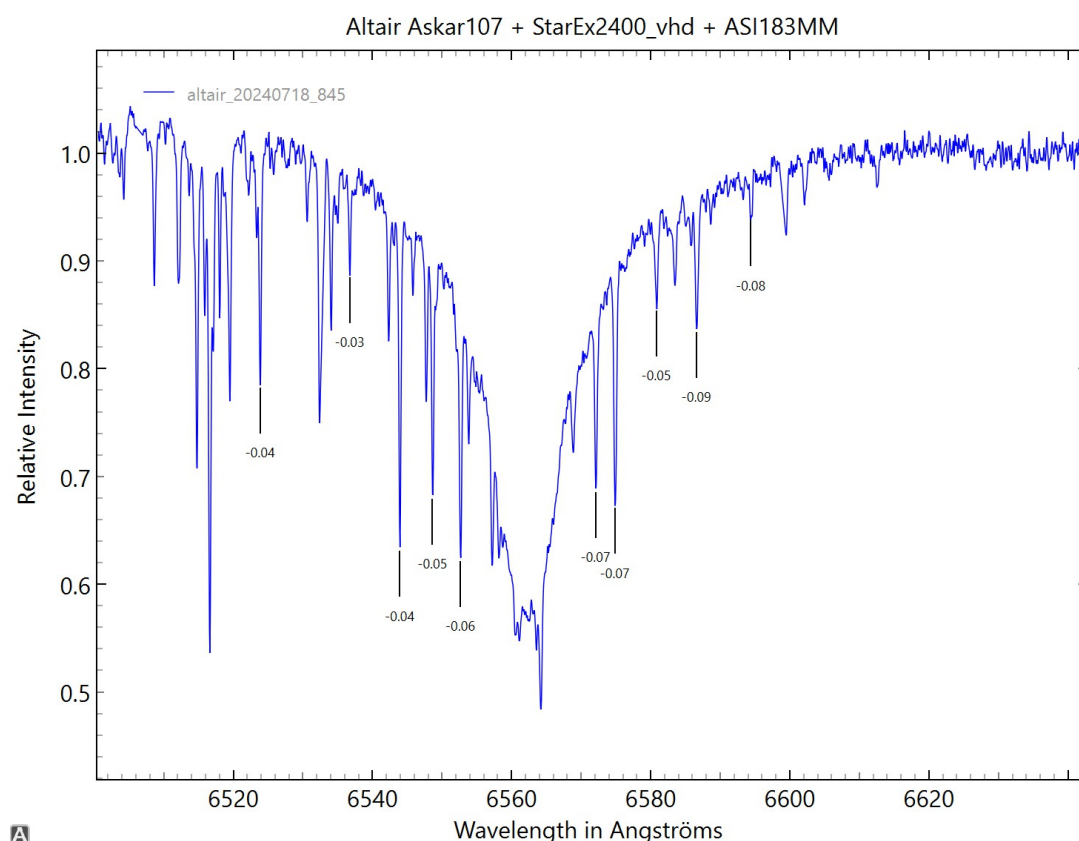
It is possible to manually enter or modify a file name; press "enter" to validate changes.

Some header fields can be edited in the grid on the right. Text fields only OBJECT', 'OBJNAME', 'BSS\_SITE', 'BSS\_INST', 'OBSERVER', 'BSS\_TELL', 'BSS\_NORM' and we can then save the file with these modifications using the "Save" button.

The analysis section lets you check wavelength calibration using the following tools  
The "verif telluriques" button for high-resolution spectra and the "verif balmer" button for medium- and low-resolution spectra. The "clear labels" button deletes the annotations produced, but only the most recent ones. To delete all labels, use the  
This is followed by the "clear" button and the "display" button, which redispays the spectrum.

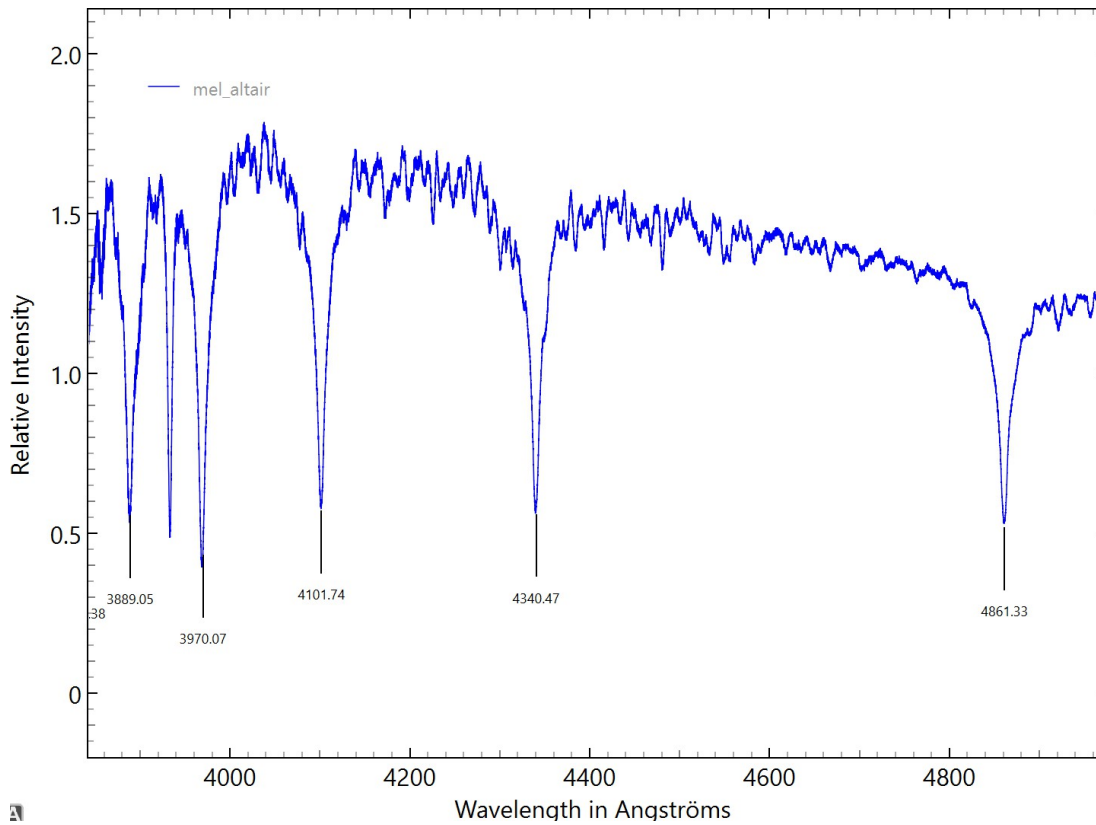
### Verif Telluriques

Displays the position of telluric lines - this function is useful for checking calibration in wavelength of a high-resolution spectrum.



### Balmer check

Displays the position of the balmer lines - this function is useful for checking the wavelength calibration of low-resolution spectra

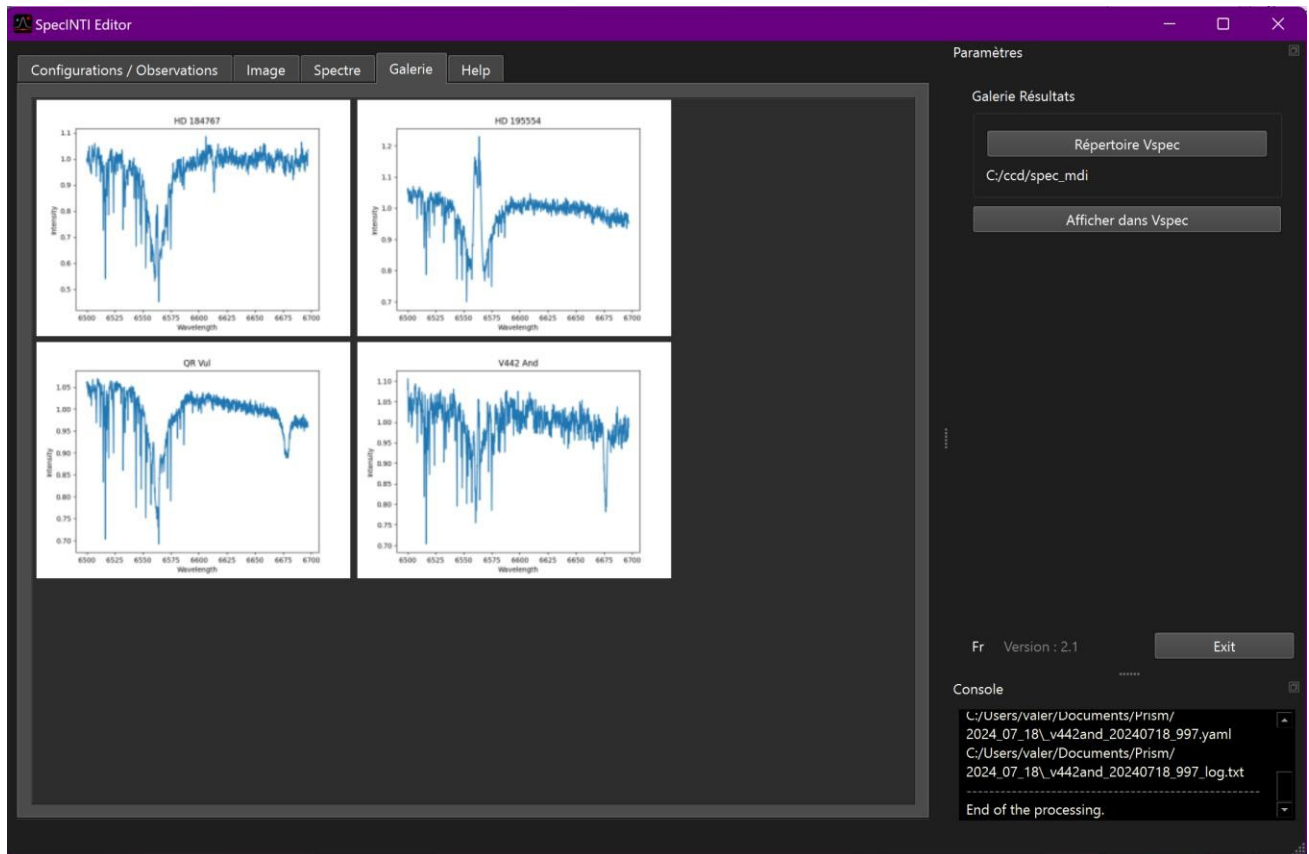


## Gallery

Thumbnail display of specINTI treatment results

You can double-click a thumbnail to view it automatically in the Spectrum

You must select the Vspec.exe directory to activate the file opening option processed in visual spec. This function is not available under Mac OS.



Gives access to four files extracted from the specinti website - select the help file in the drop-down list on the right. A text search is also available with the "search" button and its associated text box.



## Manuel param - Specinti keyword list

**AUTO\_CALIB** : *Paramètre optionnel.* Réalise une recherche automatique des raies d'étalonnage (uniquement du gaz néon) et un étalonnage spectral, lui aussi automatique. Cette fonction est utilisable aussi bien dans les modes standards d'étalonnage (#0 ou #2) que dans les modes latéraux (#3 et #4). La recherche des raies est bornée par les deux longueurs d'onde passées dans une liste. MAIS ATTENTION : **auto\_calib** n'est fonctionnel qu'en haute résolution spectrale (réseau de 2400 t/mm lorsqu'il est question de Star'Ex par exemple ou d'un Lhires III), dans un domaine spectral où les raies spectrales sont bien réparties sur toute la largeur du spectre enregistré, et bien sûr, lorsque la source d'étalonnage est une lampe du type néon.

Exemple :

auto\_calib: [6450, 6750]

Exemple :

auto\_calib: [6450, 6750]

**AUTO\_CALIB\_TH** : *Paramètre optionnel.* Seuil de détection des raies d'étalonnage en ADU pour la fonction **auto\_calib**. Les raies spectrales utilisées sont alors celles dont l'intensité au pic dépasse ce seuil. Normalement, il est inutile d'ajouter le paramètre **auto\_calib\_th**. (le seuil est dans ce cas calculé automatiquement par le logiciel), mais il peut dans quelques rares circonstances s'avérer utile de le définir manuellement.

**BIN\_FACTOR** : *Paramètre optionnel.* Facteur de binning (agglomération) des points du spectre final. Par exemple, si la valeur de ce paramètre est 2, les points sont additionnées 2 par 2 (specINTI calcule une valeur moyenne). Le binning spectral permet d'accroître le rapport signal sur bruit, lorsque celui-ci est bas dans le spectre initial, mais bien sûr, le pouvoir de résolution diminue (dans une proportion déterminée par la valeur de l'échantillonnage relativement à la finesse spectrale — il n'y a pas nécessairement une relation directe entre le facteur de binning et la résolution spectrale au final).

Exemple :

bin\_factor: 6

## Functions manual - list of Specinti script functions

### Manuel de référence des fonctions

Les fonctions sont des commandes en une ligne que l'on insère dans le fichier de configuration. Lorsqu'une telle fonction est présente (son intitulé débute par le caractère « \_ »), son code associé est exécuté, puis le programme s'arrête.

**\_version:**

Retourne la version courante de specINTI.

**\_img\_add: [in1, in2, out]**

Additionne les images (in1) et (in2) avec le résultat (out).

**\_img\_add\_item\_float: [in, item, value, out]**

Ajoute un item du type (float) dans l'en-tête d'une image FITS.

**\_img\_add\_item\_int: [in, item, value, out]**

Ajoute un item du type (int) dans l'en-tête d'une image FITS.

**\_img\_add\_item\_str: [in, item, value, out]**

Ajoute un item du type (string) dans l'en-tête d'une image FITS.

**\_img\_compute\_smile: [x1, y1, x2, y2, x3, y3]**

Calcul du rayons de courbure et du centre d'un cercle à partir des coordonnées de 3 points sur ce cercle. Cette fonction trouve son utilité pour déterminer le rayon de courbure d'un raie (dont la forme est assimilé à un cercle) de telle manière à corriger cette distorsion et rendre la raie droite (c'est-à-dire dont le rayons de courbure est infini). Le résultat est fourni dans la console de sortie. Exemple :

\_img\_compute\_smile: [1669, 23, 1666, 414, 1669, 678], avec pour résultat un rayon de courbure de 17200 pixels.

**\_img\_fill: [in1, x1, x2, out]**

Met zéro les parties de l'image (in) entre x=1 et x=x1 d'une part, et entre x=x2 et x=largeur maxi. Le résultat est l'image (out).

**\_img\_make\_offset: [in, out]**

Génère une image (out) dont l'intensité est égale à la moyenne des intensité dans l'image (in).

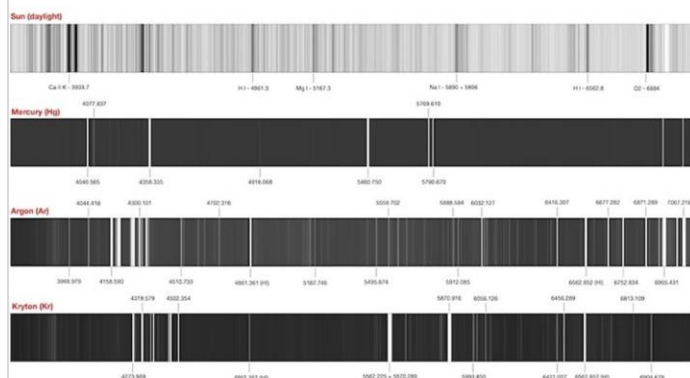


## Atlas - lamp spectra, sky background, solar spectrum

### Atlas de raies dans les sources spectrales

Ce document regroupe un ensemble de spectres de sources spectrales, à consulter lorsque vous désirez trouver la longueur d'onde d'une raie particulière à partir d'une des lampes d'étalonnage ou dans un spectre naturel (le spectre solaire par exemple).

Ci-après, spectre de lampes à décharges, par l'auteur :



[http://www.astrosurf.com/buil/specinti/Atlas\\_Spectral\\_Lamps.pdf](http://www.astrosurf.com/buil/specinti/Atlas_Spectral_Lamps.pdf)

## Specinti checklist

### Aide-mémoire specINTI / specINTI Editor V2

Projet Sol'Ex/Star'Ex : <http://www.astrosurf.com/solex>

Christian Buil, Valérie Desnoux, octobre 2024

## 1. Objet

Ce document présente **specINTI** et **specINTI Editor** (version V2 et ultérieures). Il ne s'agit pas d'un manuel complet d'usage, mais plutôt d'un aide-mémoire des fonctions principales dans des situations courantes, couvrant les modes de traitement en haute et basse résolution spectrale, ainsi qu'une section dédiée aux spectres d'objets étendus (tels que les nébuleuses). Référez-vous à ce document en cas de doute sur le déroulement des opérations.

Pour commencer, rappelons que **specINTI** est le moteur de calcul principal pour le traitement des spectres, tandis que **specINTI Editor** est une interface graphique qui interagit avec specINTI en fournissant deux fichiers essentiels :

- Un **fichier de configuration**, définissant les paramètres de traitement des spectres ;
- Un **fichier d'observation**, contenant les données spectrales à analyser.

Ces deux fichiers peuvent être édités directement dans specINTI Editor, qui intègre plusieurs outils pour simplifier ce travail, mais aussi pour visualiser le résultat des traitements et la qualité.

Vous pouvez télécharger l'ensemble specINTI/specINTI Editor via ce lien :

[http://valerie.desnoux.free.fr/inti/specinti\\_editor.zip](http://valerie.desnoux.free.fr/inti/specinti_editor.zip)

## 2. Le traitement de spectres à haute résolution