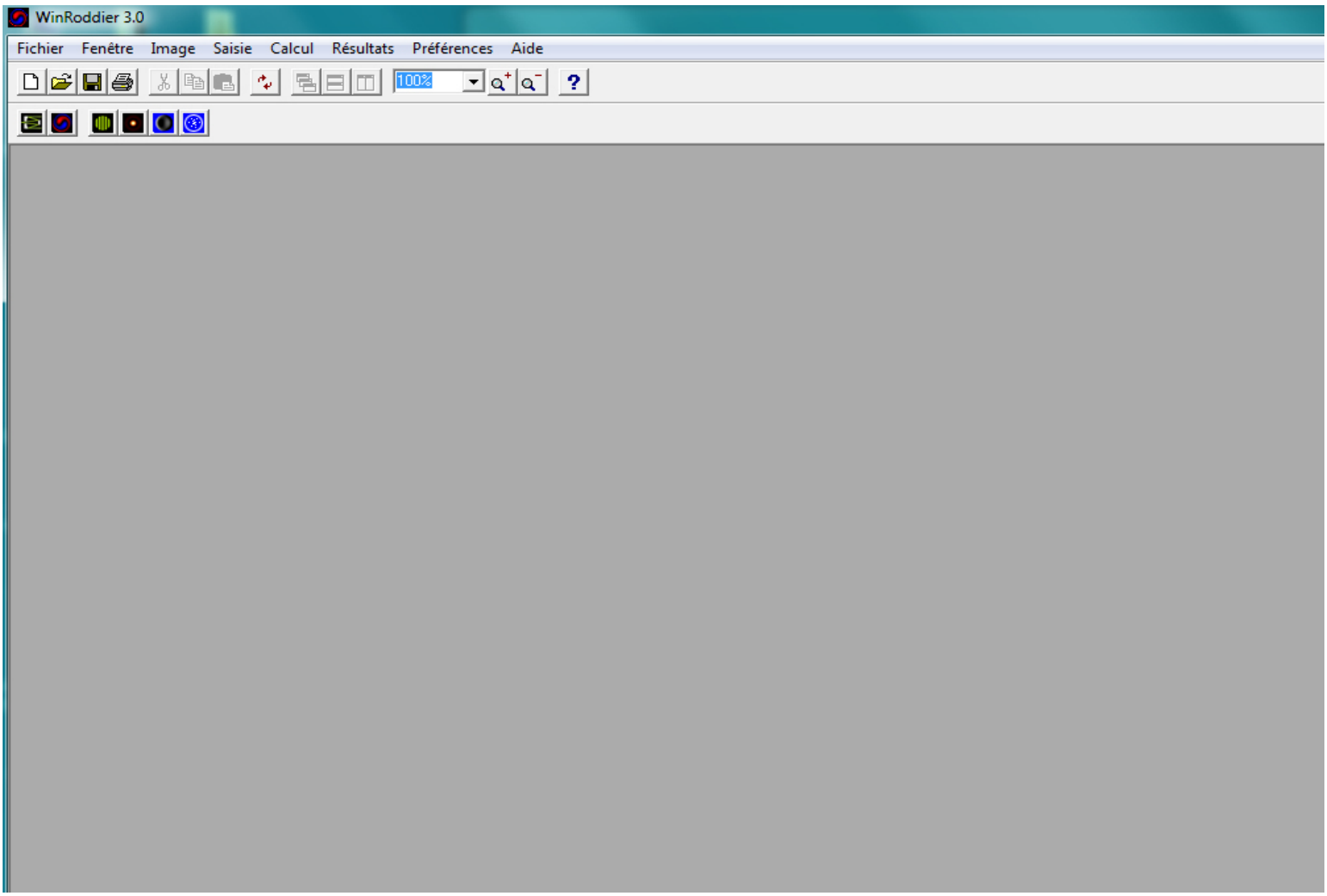
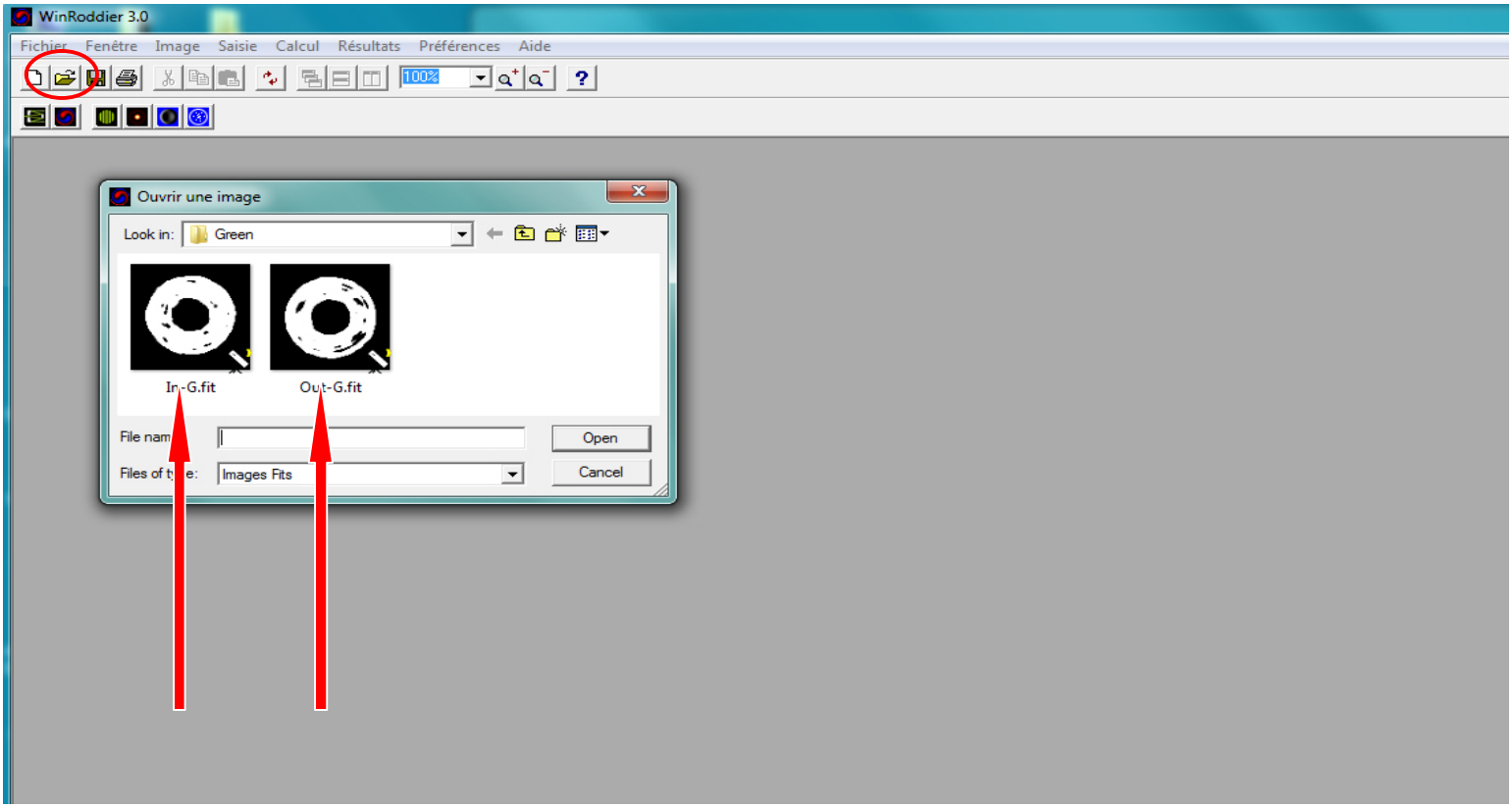
Quick Start Quide for WinRoddier Ver. 3.0

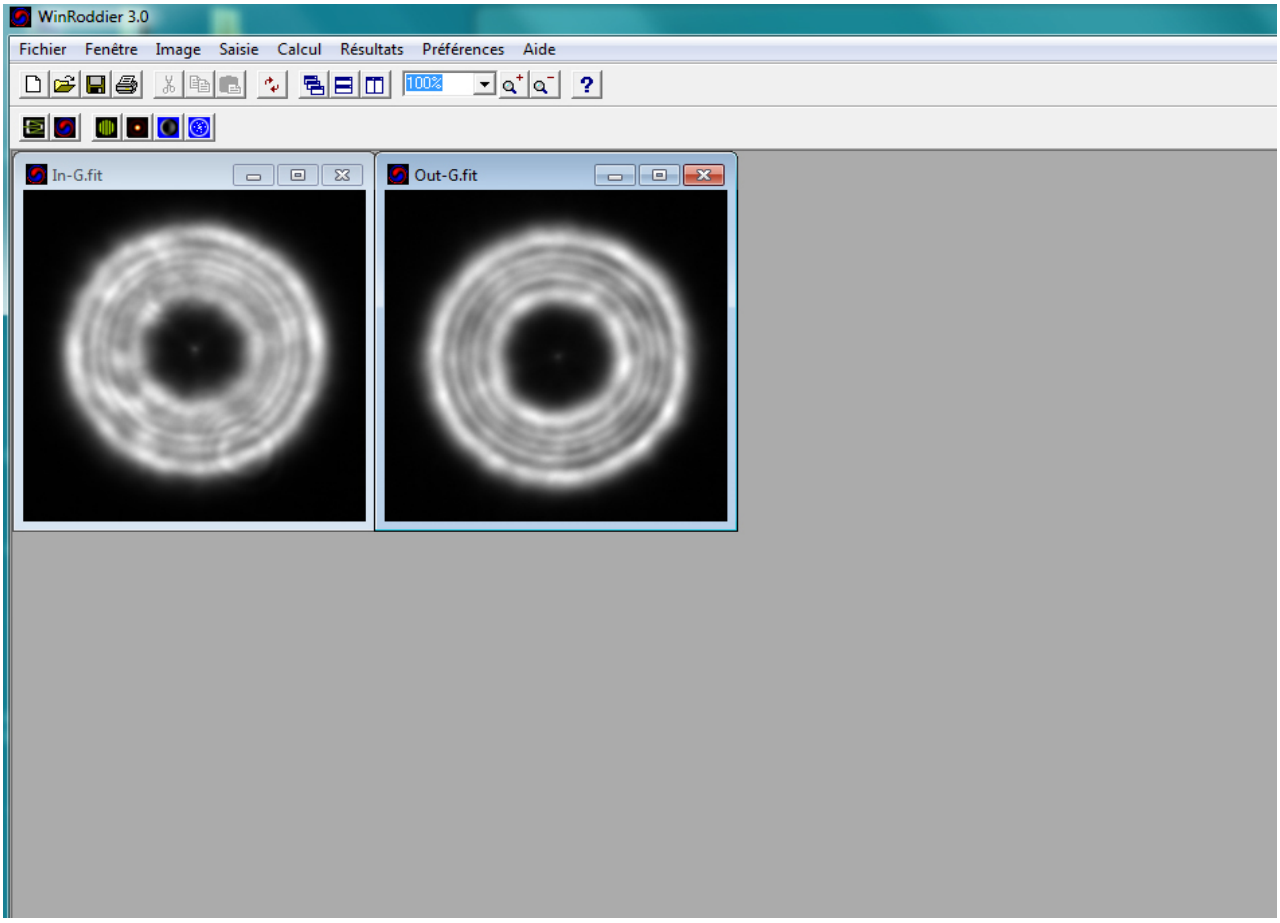
****Note, for best accuracy of the optical test described below, you must first prepare your master In and Out-focused files according using the Glenn Jolly software app "WRFITS". Join the Yahoo Roddier User Group to obtain access to the downloadable WRFITS software.**



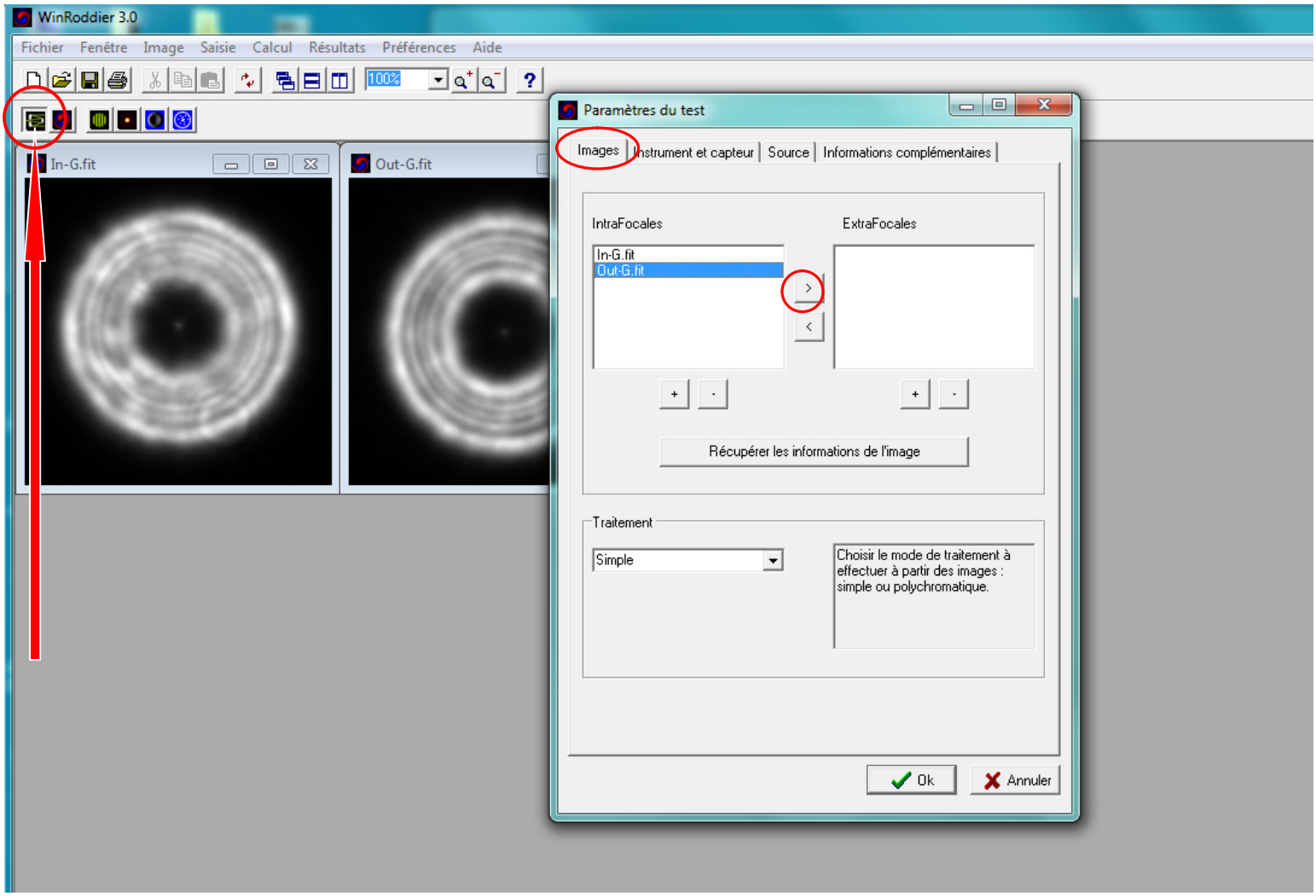
The main WinRoddier Ver. 3 GUI window (French version is only one available at time of this document).



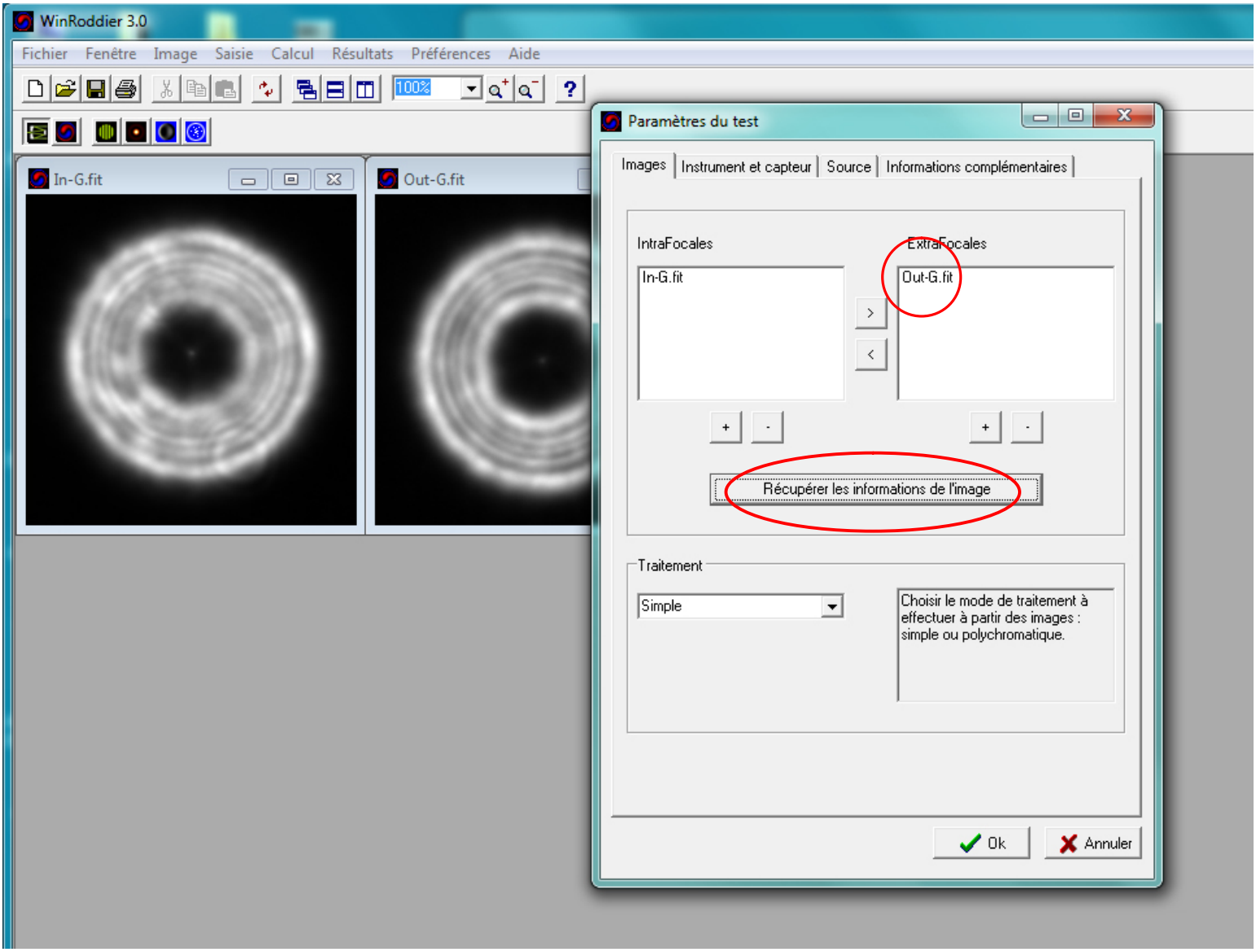
Open the Intrafocal file first by clicking on the Open File Button (see red circle), and browsing to the directory where the files are located. Then, re-click the Open File button again and open the Extrafocal (outfocused) file.



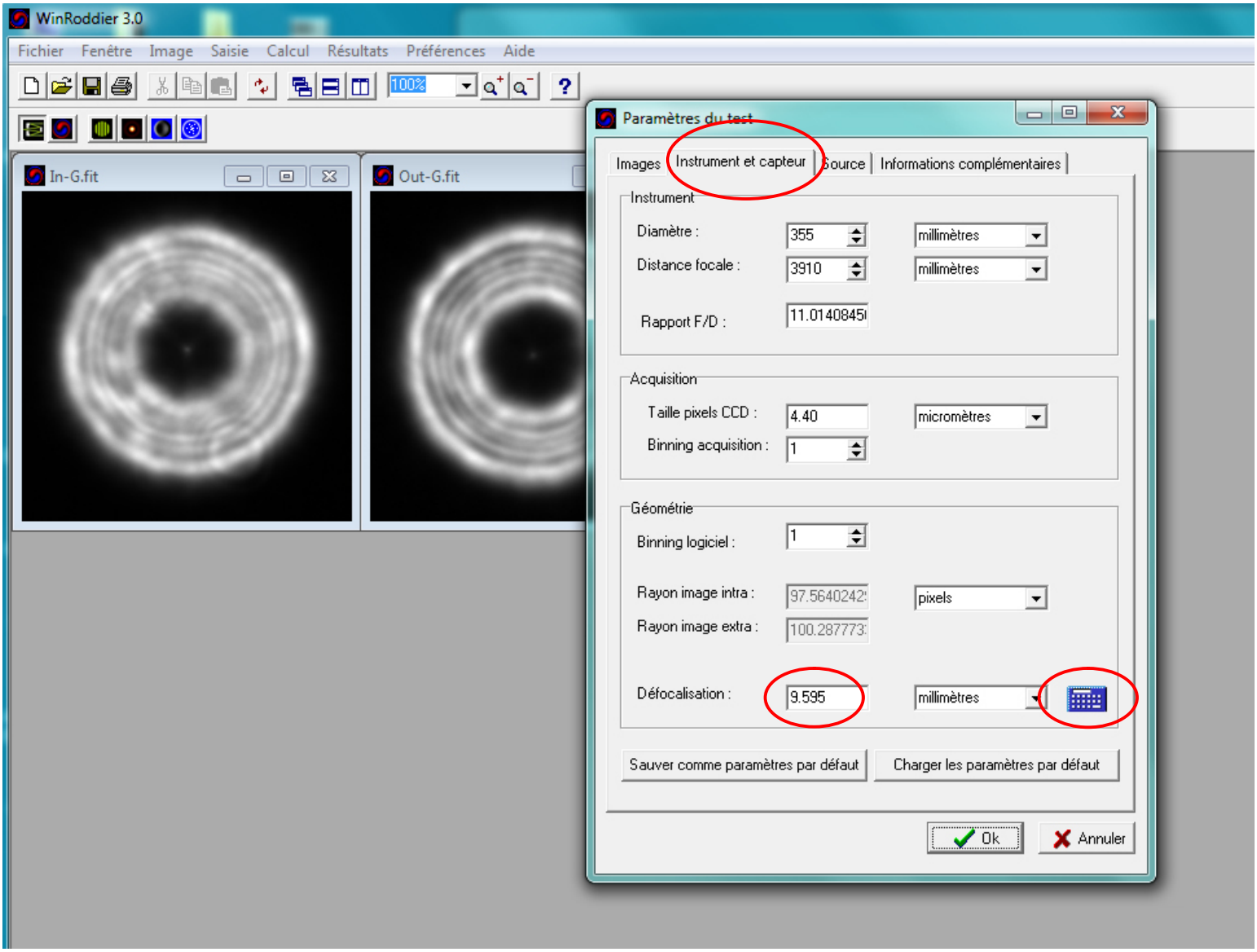
This is how the window looks after both files are opened.



Click on the Parameters button to open the dialog box. The "Images" tab of the dialog box should be selected first. If it isn't do so manually with a mouse click. Note, the Out-focused file is over on the left side with the In-focused file. This is incorrect. Highlight the Out-focused file and move it across to the other pane with the right arrow button.

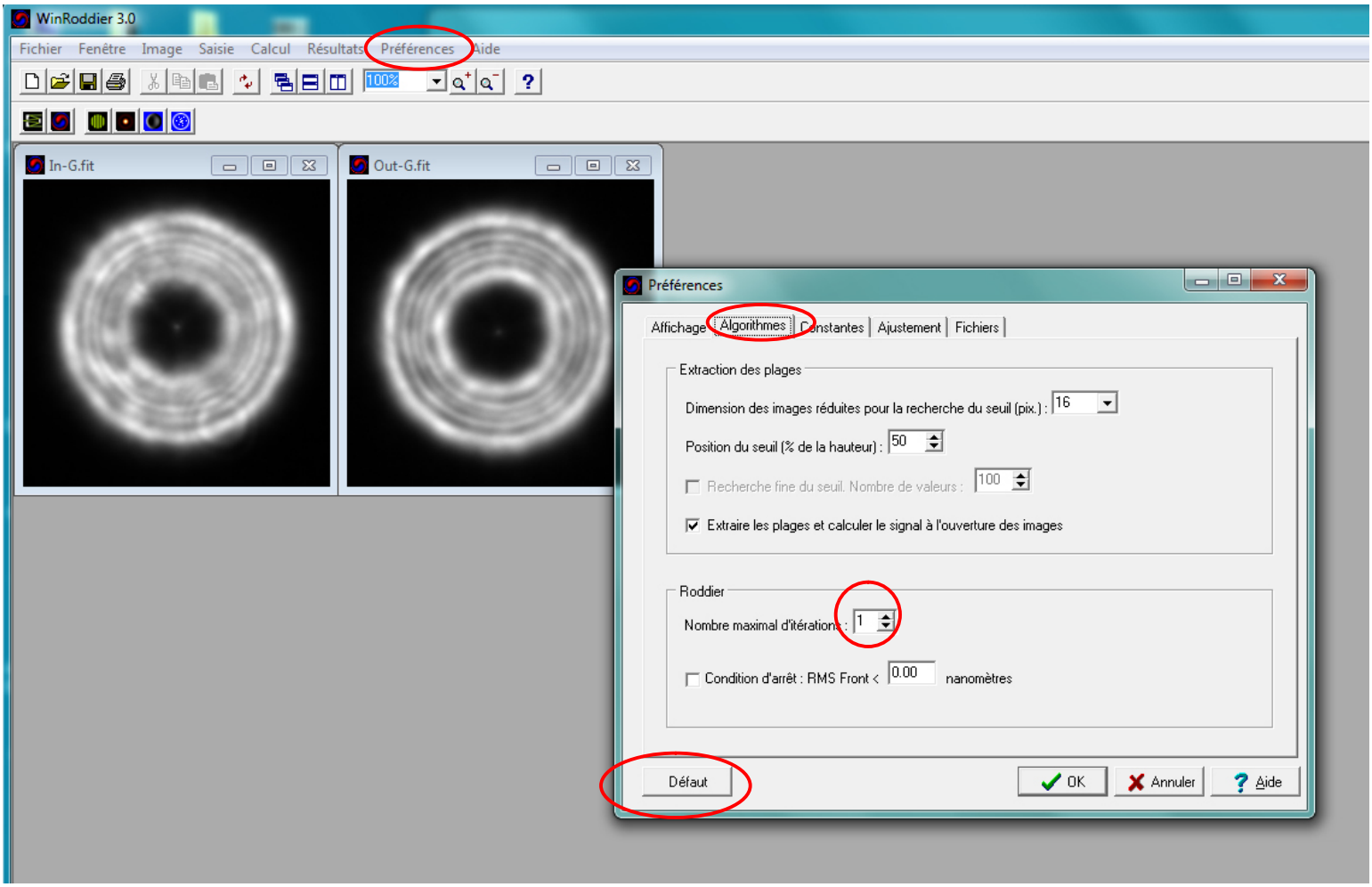


This is how the Parameters window should look once you have the files correctly positioned in the window panes. Now click the center button indicated by the red circle to extract the file information to the WR software for analysis.

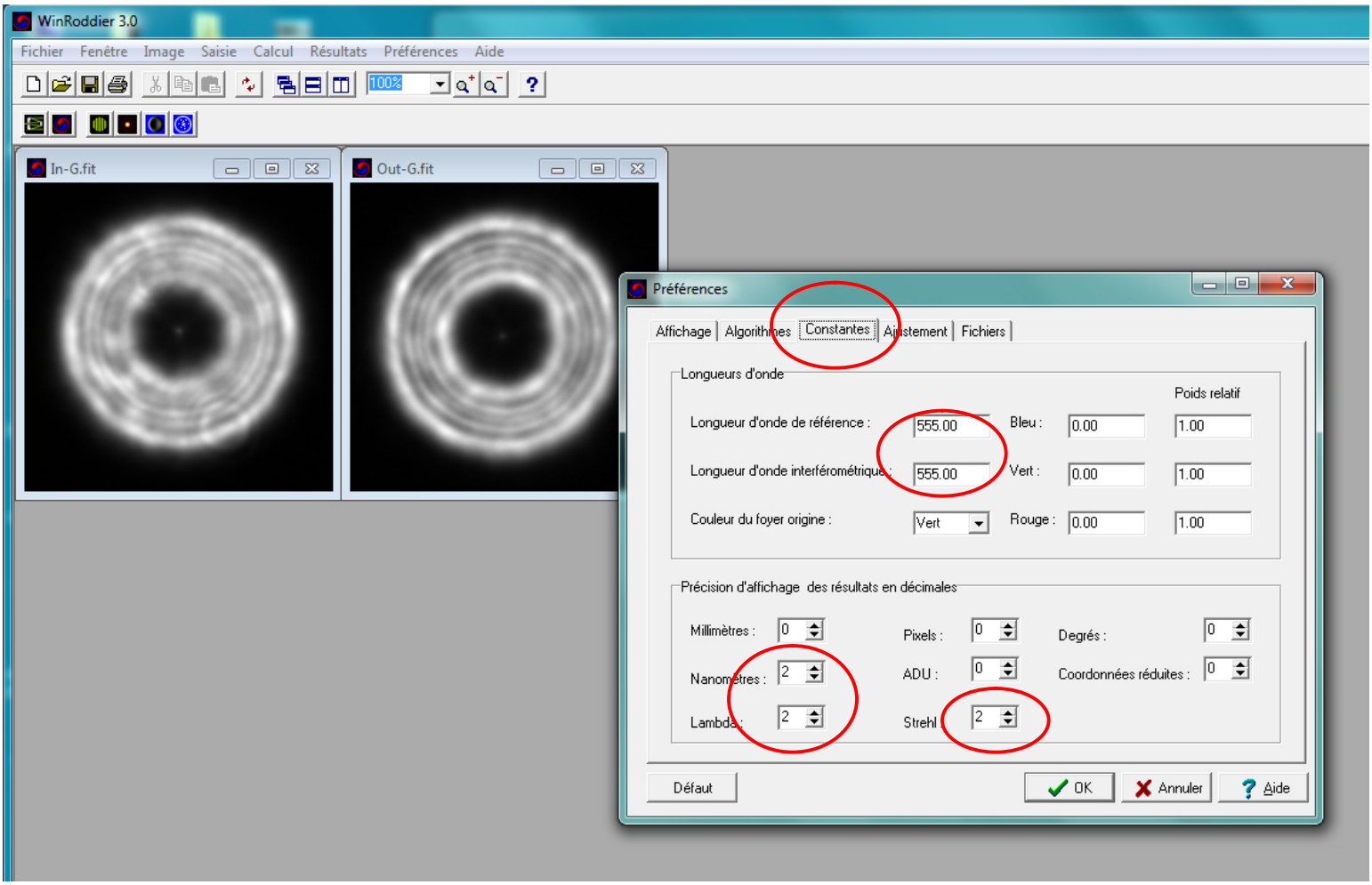


Now go to the Instrument tab, select it by clicking on it, and fill out the various parameters that are specific for your own telescope and camera. In this example, the following equipment was used:
C14 SCT scope of 355mm aperture diameter, 3910mm focal length, (focal ratio of f/11 is calculated automatically by WR), and camera's pixel micron size was 4.40 microns. Note, it may be necessary to bin the camera 2x2 when imaging the test star in order to get the target on-screen star diameter into the appropriate size range of 100-150 pixels. So the value you input there matches the binning you actually used for the image stack.

Now after filling in these parameters, click on the calculator button to auto-calculate the defocalization (in this case, it was 9.595). Now click the OK button to complete your instrument Parameters setup.



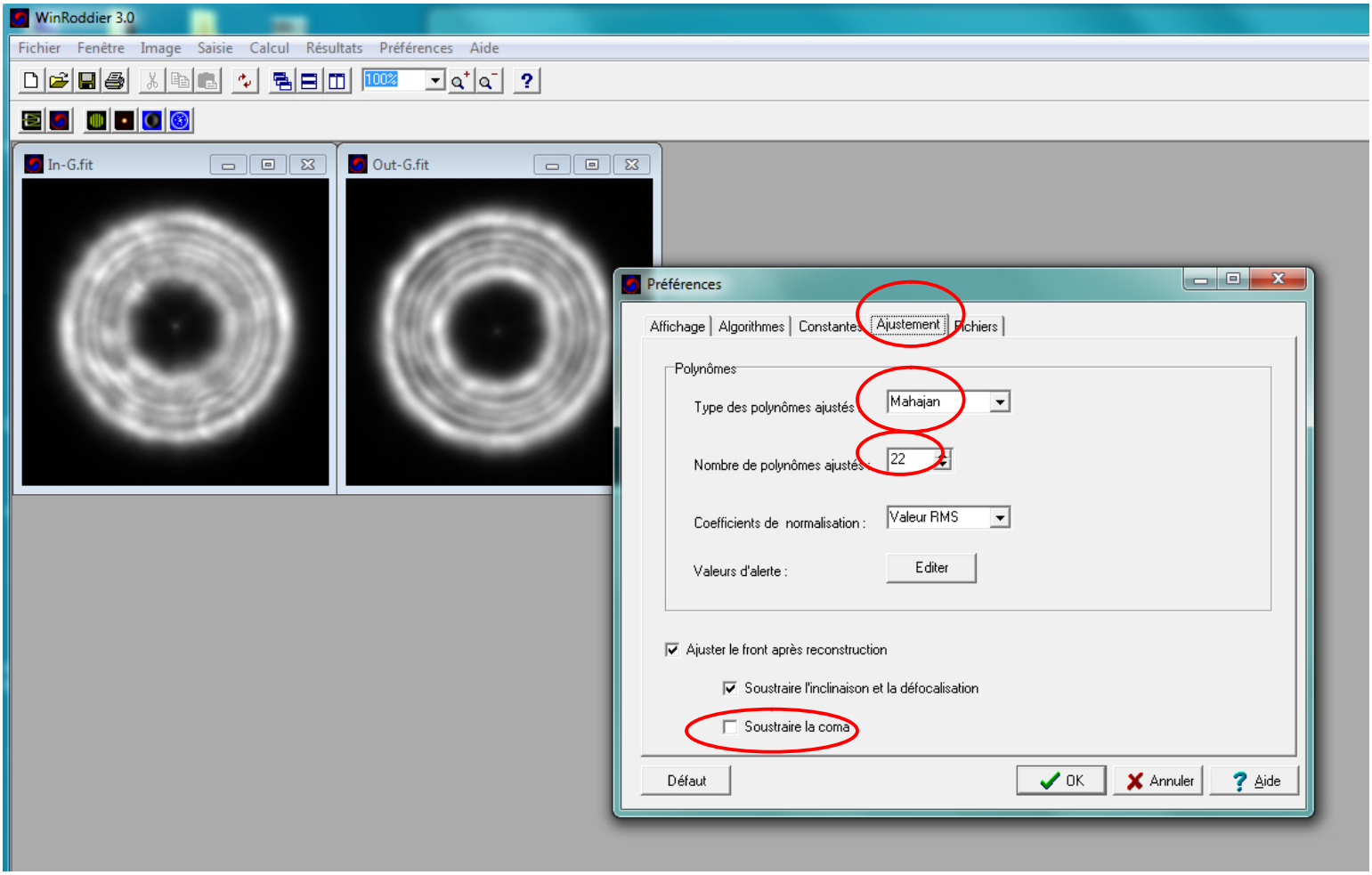
Open the “Preferences” tab, and in the Preferences window, click on the Algorithms tab. The default Iterations setting is “3” (note, I have it set to "1" in this screen shot, but usually you want at least "3"). This will work fine most of the time. If you shoot in very steady air, you can try bumping this value up all the way to 7 or so and it will give you very good analysis of specific optical aberrations such as Coma and Astigmatism. The “Default” button will return you to the factory settings for this window if needed.



Now click on the "Constants" tab of the Preferences window. This setup is critical to WR analyzing your files properly. If you shot your analysis files in the Green bandwidth (most common color), or you are using the Green files split from a full-color RGB image, set both of the two wavelength dialog boxes to "555" as they are shown (also the software default). This is the midpoint of the Green wavelength. The lower section of this window is the "Decimal" setup for the various numeric readouts that are produced when WR calculates the wavefront from your images. These values represent the number of decimal places to the RIGHT of the decimal point of the value (example, Strehl setting of two decimals would readout "0.97 for a Strehl of 0.97.

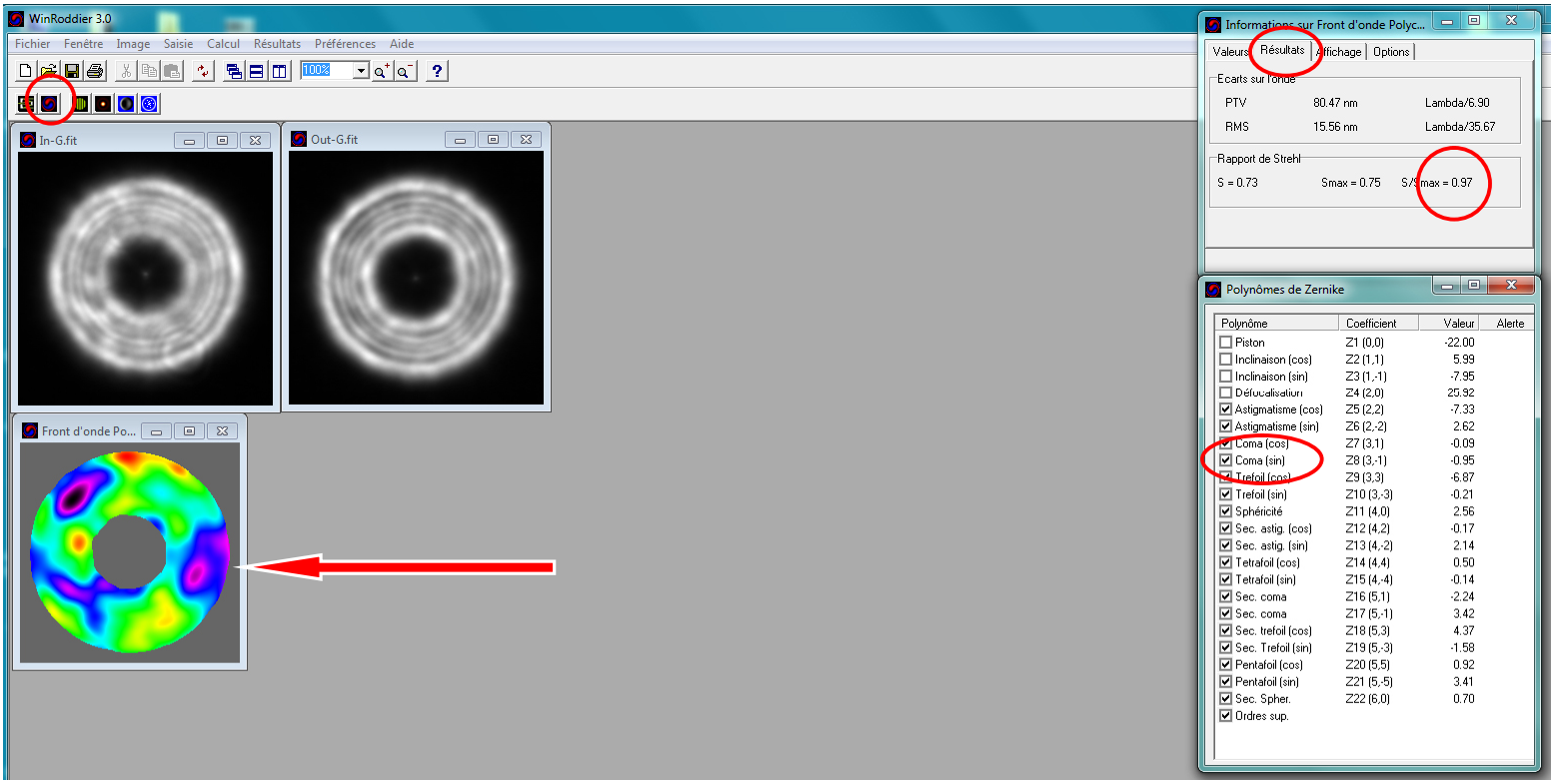
*****If you don't change this from the factory default of "0", all your Strehls will readout as simply "1" !!!! So watch for this when you do your setup as this is very easy to miss!*****

Normally there is no point setting the Strehl decimal value to more than 2 when testing on real-sky stars as this would typically be measuring beyond the accuracy of the software and "down in the noise" from test environment variables anyway, and would not be particularly reliable out to thousandths of a Strehl.



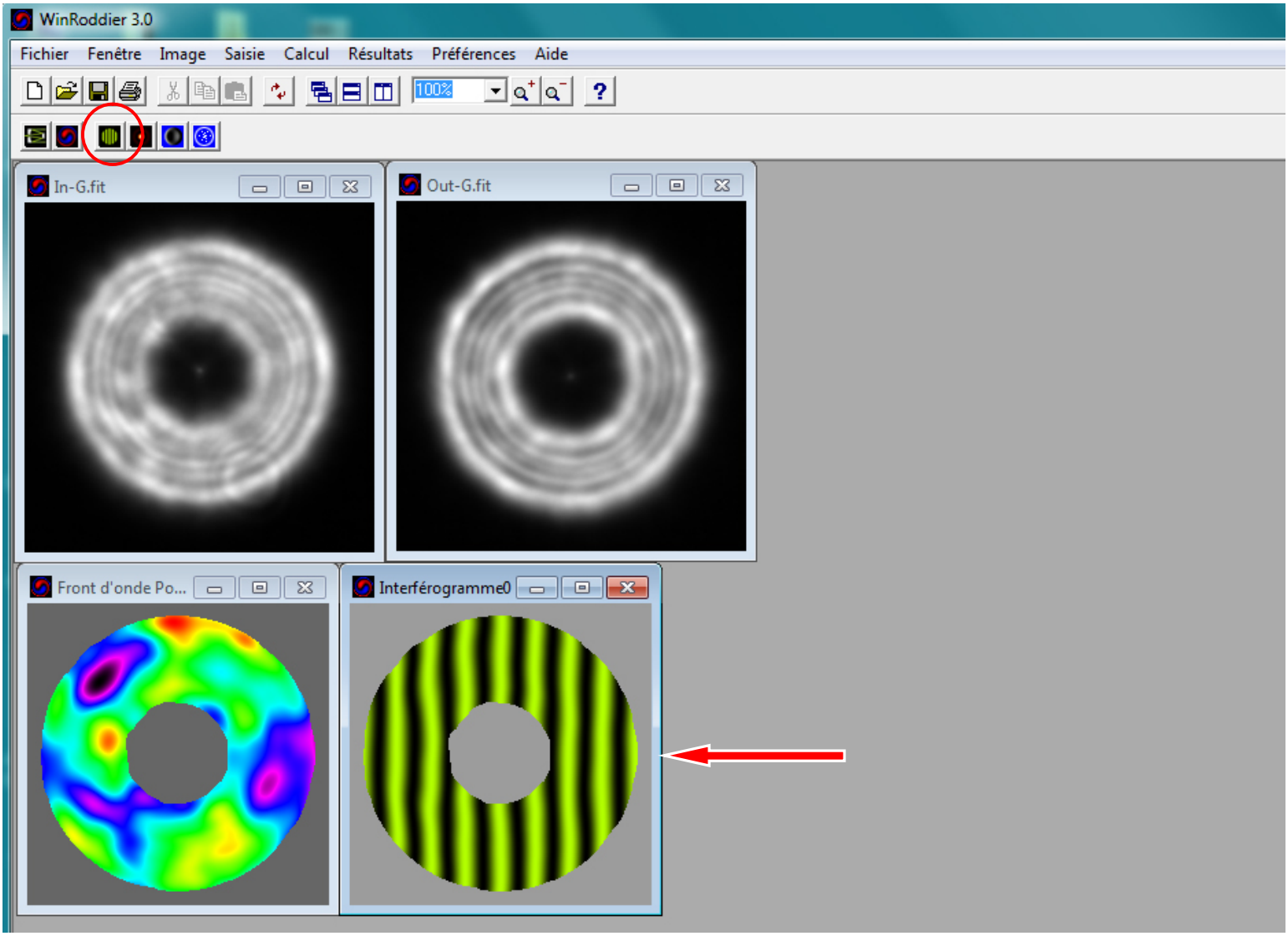
Now click on the "Adjustment" tab of the Preferences window. The factory default Polynomial type is "Mahajan" and may be the most accurate most of the time, but don't be afraid to experiment with this setting. For real-sky star analysis, the default number of 22 polynomials to be analyzed should do fine most of the time. If your data was shot in very steady air, you can try bumping this value up to 28 to get slightly more accurate and specific results. Now click OK to lock in all your Preferences settings.

****NOTE: leave the coma checkbox UN-checked if you want to have the primary Coma analyzed and included in the Strehl calculation. This will make the two topmost Coma checkboxes in the Zernike polynomials window (see next page) stay checked for analysis permanently (unless you decide to check this box back on later).**

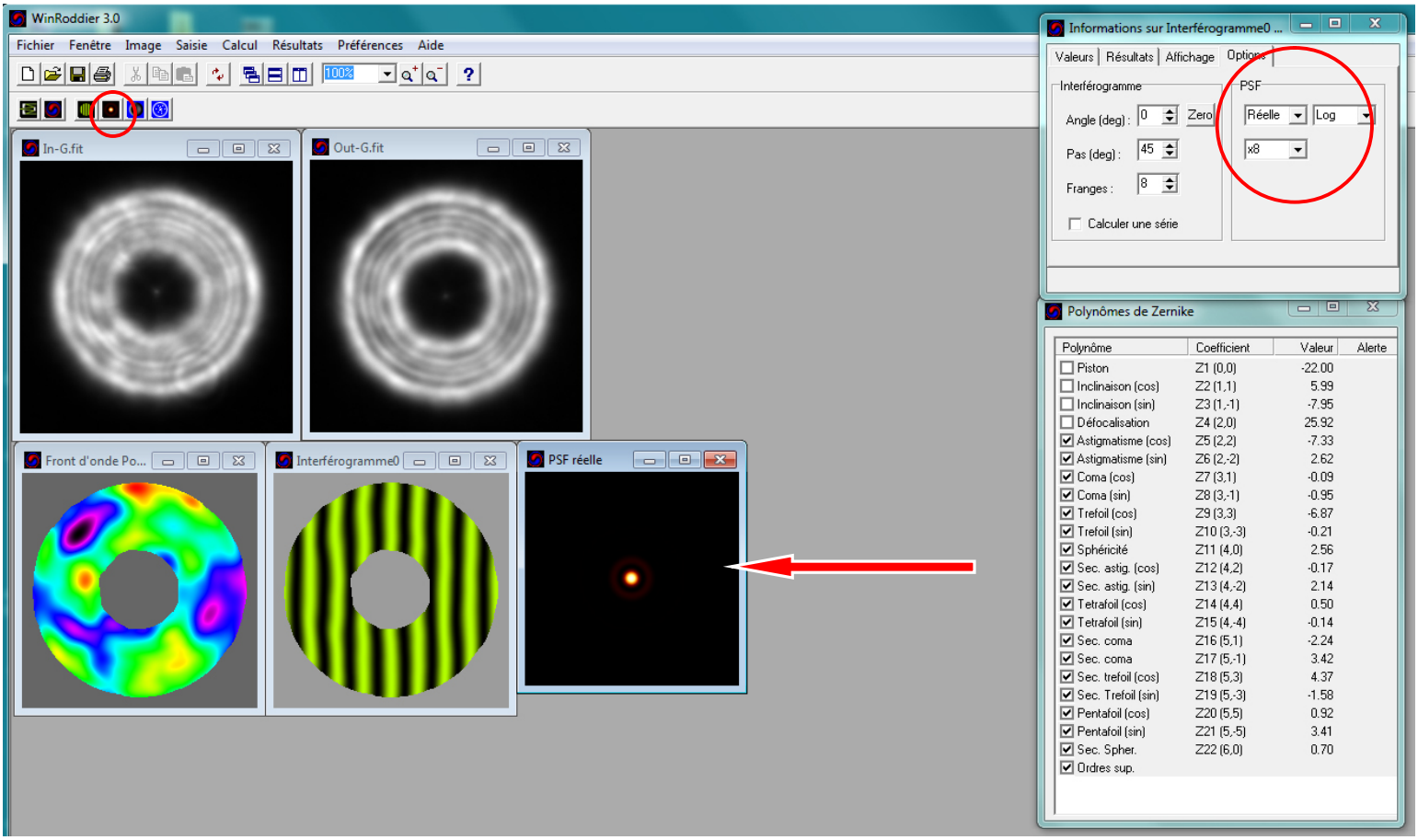


You're now ready to make your WR analysis go! Click on the "Calculate Wavefront" button icon in upper left of WR window. Once it's done, WR will produce a graphical map of your optics wavefront, and will also open a Results window. Click on the "Results" tab of the window to display the Strehl value (3rd value in the row as indicated by red circle). Note that the two top-most values for "Coma" in the Polynomials list may NOT be checked as the default. See preceding page above for how to set your preferences up to include these two checkboxes in the calculation. Sometimes it is helpful when assessing collimation of the telescope to check these ON and see if the Strehl value drops significantly (no need to recalculate when checking these boxes on and off).

****This is one of the powerful features of WinRoddier: it allows you to selectively assess different parameters of your telescope's performance by checking ON/OFF these boxes one-at-a-time to see if you have optical alignment issues, astigmatism problems (mis-figured glass or tilted mirrors with respect to each other), significant spherical aberration, or other problems.**

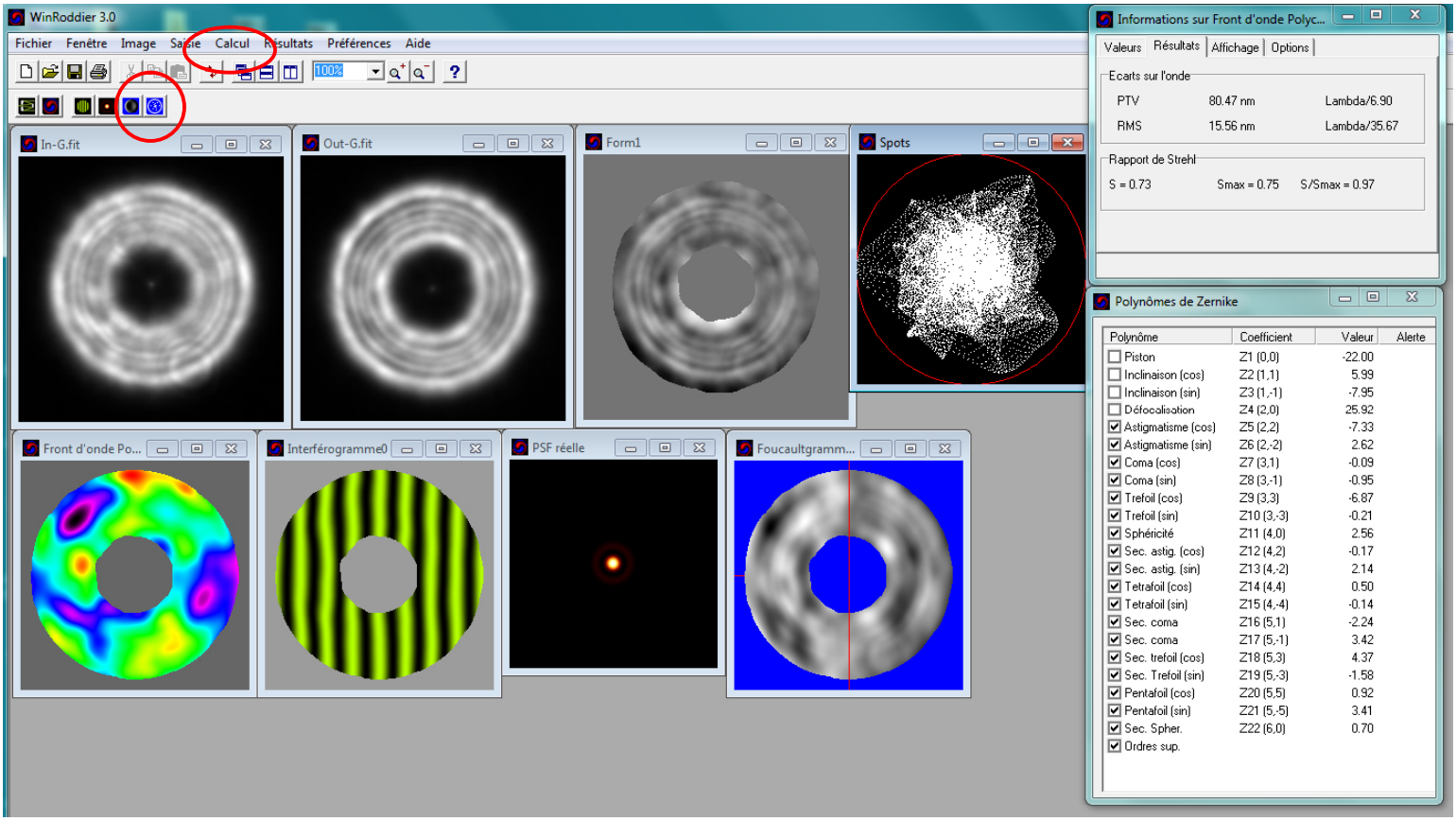


OK, now we're ready to make our next calculation. Click the Interferogram button in upper left button-row to produce a synthesized interferogram image similar to what an interferometer would do. You can use various online resources to learn how to read these to tell if your scope's glass is under or over-corrected, or the scope has other problems. This is particularly valuable when analyzing the full R,G, and B bandwidths. This allows you to tell for example if the scope is undercorrected in Red (not a problem at all, and will fix itself significantly as the glass temp cools and equalizes), or OVER-corrected in Red (usually a very bad problem that will only get worse through the night as temps drop!).

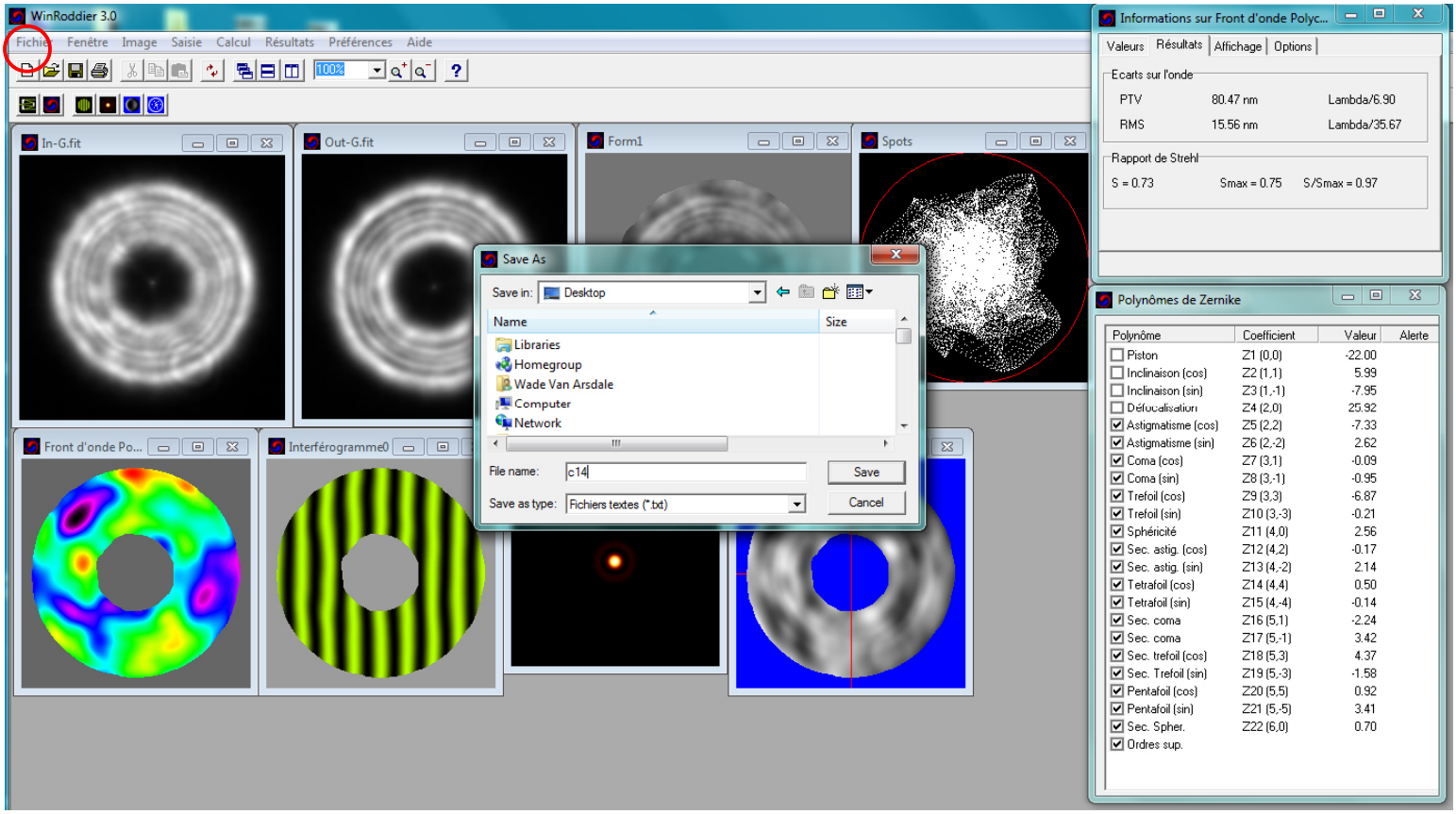


Now you're ready to calculate the PSF and produce a simulated star. Click on the PSF Calculate button in the upper left of WR's main window and you will get the PSF image shown above. You can alter the PSF options to produce a "log" image showing the diffraction rings better. This "Log" setting can sometimes be useful as a tool for assessing the collimation of your telescope. You can also magnify the PSF outputted image to see it better on your pc screen.

****Unfortunately, it appears the PSF "Log" feature may be broken in the current 8/23/2013 release of Winroddier (Ver. 3.0). Try Ver. 2.2 instead if you want to be able to see what the "log"-formatted PSF pattern looks like. ***UPDATE 12/1/2013***: See the main WR Ver. 3 user manual for an alternate way to tweak and use the PSF image in WinRoddier.**



The final two buttons to click on the button-row at upper left are the Focault-gram and Spots buttons. The "Calculate" Menu item ("Signal" and other items inside that menu) can also be investigated for its features and image file output.



If you would like to analyze your telescope's optics further from inside the freeware OpenFringe software, go to the "Files" menu item in the upper left of the WR main window, select "Save Zernike Coefficients" from the dropdown menu, and save the file as an ASCII Text file (.txt extension for use in Windows Notepad), for later use in OpenFringe. NOTE, there is a conversion calculator tool made available as freeware by Glenn Jolly (thanks Glenn!!) that you must run this .txt file through after saving it to be able to read it from inside OpenFringe.

****Note, the Zernike conversion app tool is still under development as of this writing, but will be available very soon so stay tuned to the Yahoo Roddier Group and CN Forums for upcoming news on this!**

***** Credit and many thanks to the following people for making these powerful telescope optical analysis tools available freely on the Web for use by amateurs everywhere, and also for their help in pushing along this project to its completion as well as helping amateur astronomers understand the WinRoddier software and how powerful it is for knowing how well your telescope can perform, instead of just guessing:**

1) **AstroSurf Development Team**
2) **Glenn Jolly from Cloudy Nights Forums.**
3) **Yahoo Roddier user group and John Biretta.**
4) **Frank "freestar8" from the very useful MetaGuide software app and CN Forums.**
5) **Mark Crossley for his work on converting the WinRoddier French GUI interface into English.**