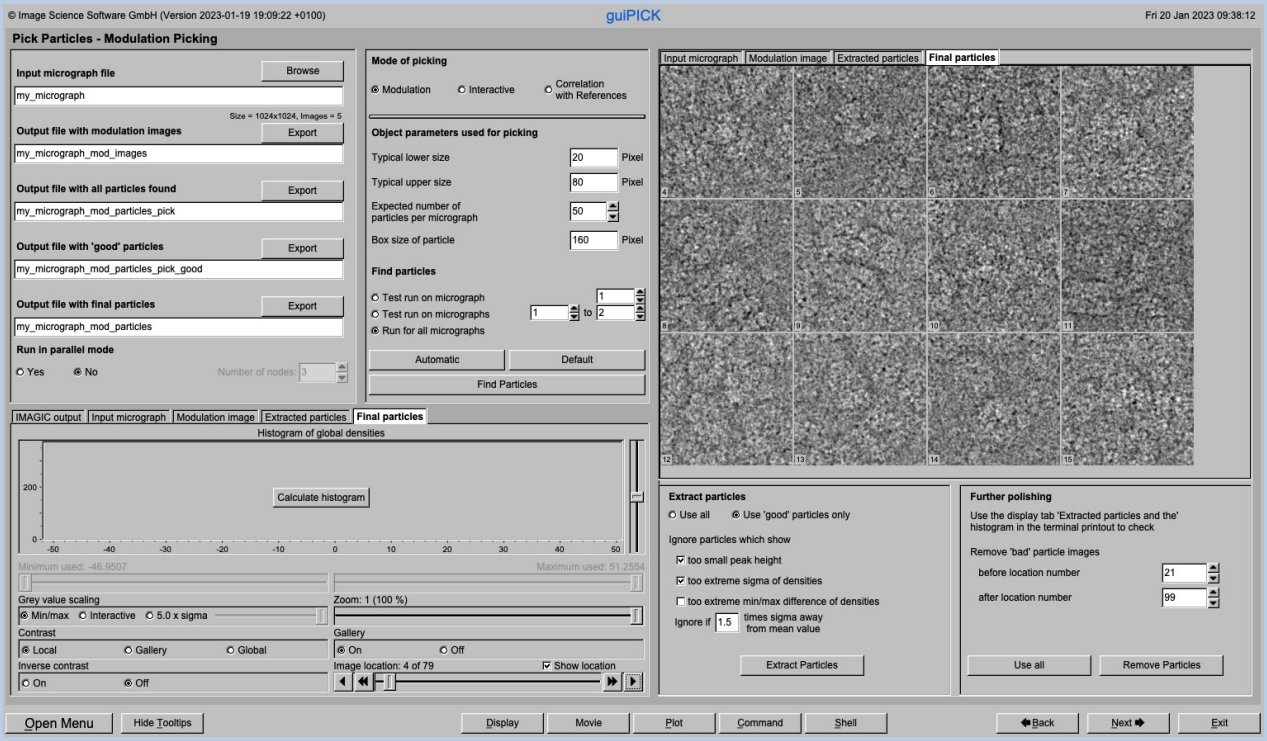
A Brief Introduction

Version 10-Oct.2023
www.ImageScience.de

The IMAGIC guiPICK program

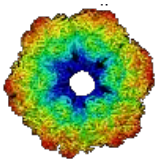


The **guiPICK** program follows a work-flow from Import Micrographs to various pages to search and extract particles from input micrographs.

This is a brief hands-on on how to use IMAGIC GUI oriented programs and how to work with **guiPICK** :

CONTENT:

- IMAGIC GUI programs — How to use IMAGIC GUI programs
- guiPICK — How to search and extract particles
  - > Import Micrographs
  - > Prepare Micrographs
  - > Pick Particles: Modulation Search
  - > Pick Particles: Interactive Search
  - > Pick Particles: Get References from Modulation Search Search
  - > Pick Particles: Prepare Correlation Search References
  - > Pick Particles: Correlation Search
- Error hints — How to send us feedback



IMAGIC

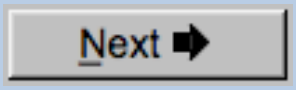
GUI Programs

Workflow

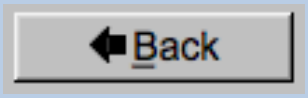
The idea of **guiPICK** is to guide you through a typical camera/detector correction measurement or camera .

The workflow consists of several pages. Each page will perform a specific image processing step.

If the calculations are finished the results are shown and you can press the “Next” button to continue with the next page.



Of course, there is also a “Back” button. But be careful: when leaving a page the results shown on the page may get lost and when coming back you might have to do the calculations once more to get the results printed. The output files do not get lost, of course.



The Working Directory

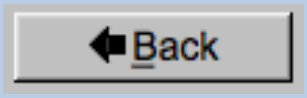
If **guiPICK** is called from the programs list, by using an icon or in a command line the working directory will be your default system directory.

If **guiCTF** is called by an IMAGIC command in a terminal / command window

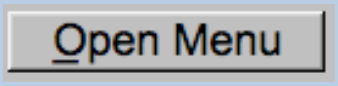
```
IMAGIC-COMMAND : guiPICK
```

the working directory will be the directory used in this window.

If you want to change this directory use the “Back” button(s)



or the “Open Menu” button



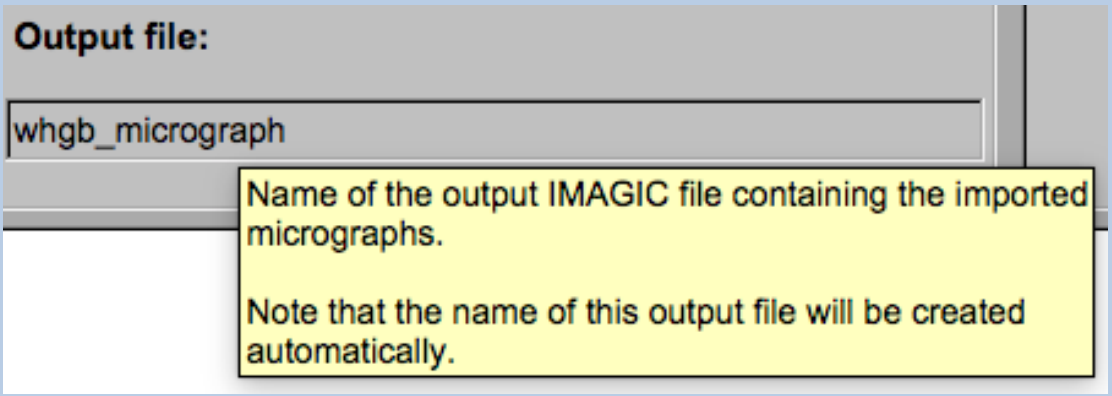
to navigate to the “Start” page where you can specify the working directory of **guiPICK**.

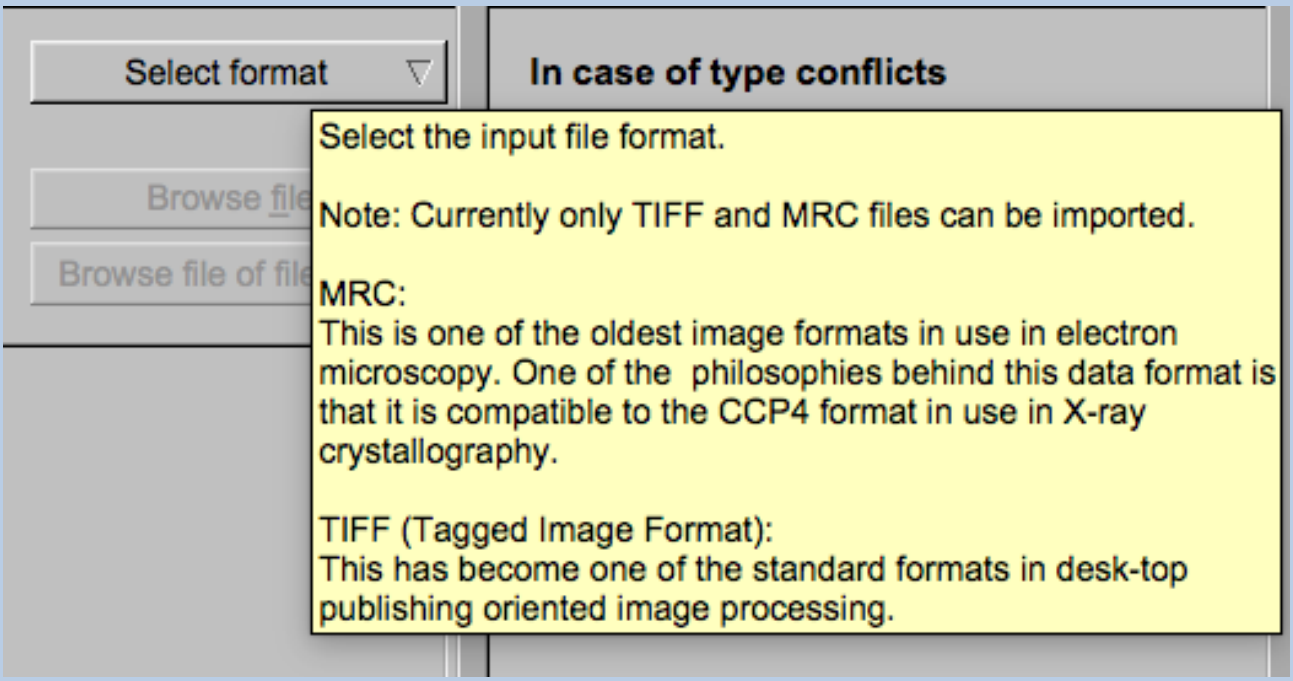
All output files will be stored in the working directory which you have specified on the start page.

Input files can be chosen from other directories.

Help

Move the cursor on (nearly) any item (questions, radio buttons, display windows…) shown on the pages and you will get context sensitive help.





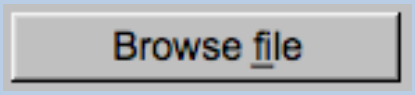
Input Files

Usually the input files on each page are output file(s) from the previous page(s) and are suggested automatically.

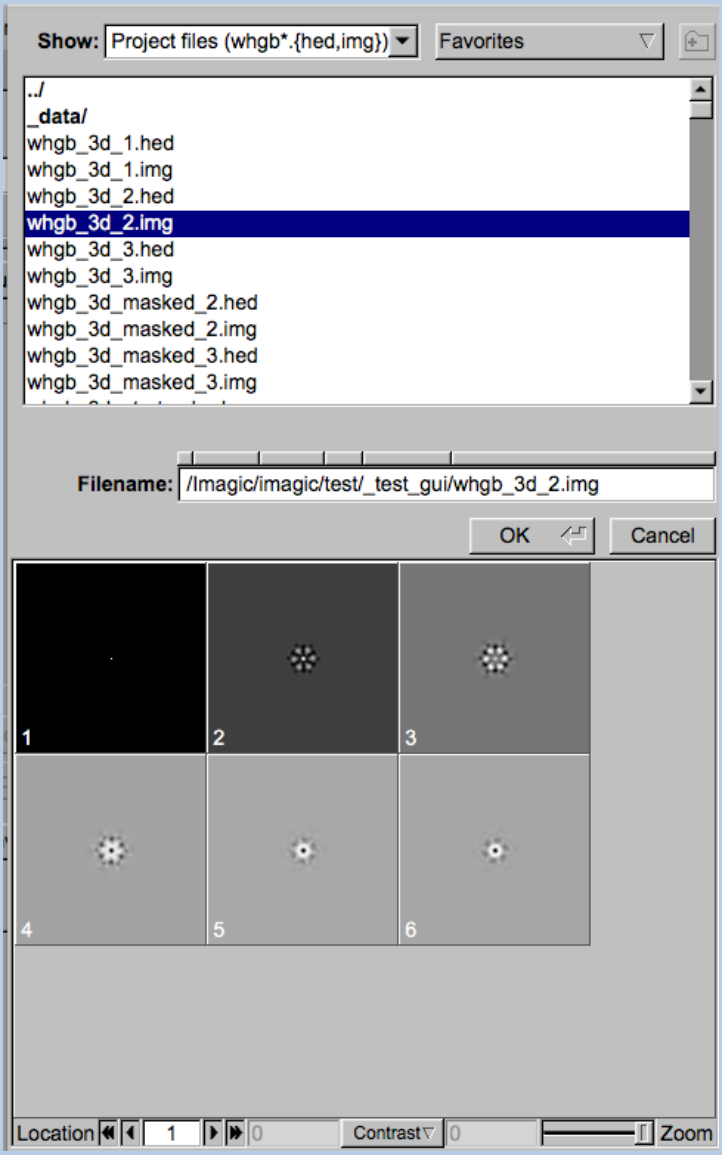
You can, of course, always use other input files names and even use other input directories.

Input File Chooser

In most of the pages you are asked for input file(s) and you will find a “Browse file” button:

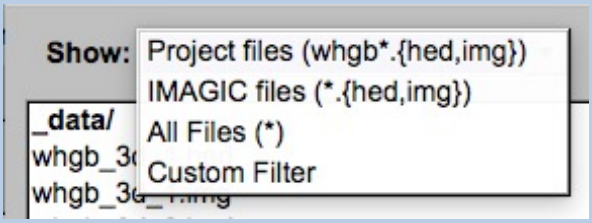


Pressing this button will open the IMAGIC file chooser:



Choose the wanted file by clicking its name

You can use a pre-selection of the files shown:



If the images are in IMAGIC format you can get a pre- view of the images.

Note that you can store your directory in “Favorites”.

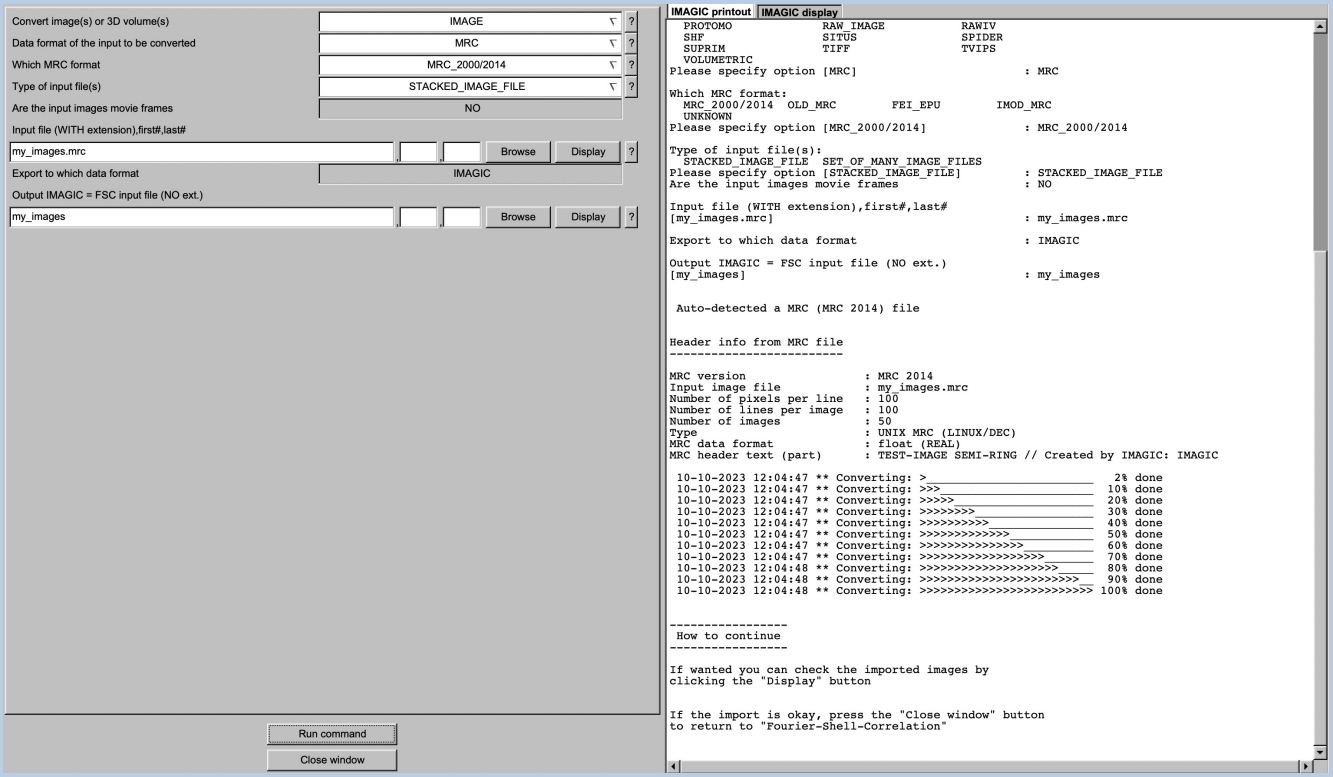
Output Files

Usually the names of the output files are suggested but it is your choice, of course. On each page you can specify these output file names on the left hand side.

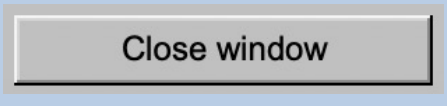
Import Buttons

You do not want to use the “Import page” you can sometimes use an “Import” button to import the input images/3D volumes from any 3DEM format. The “Import” button which is located above the text field specifying the name of the related file.

An additional “IMAGIC EM2EM” page will open. Specify all parameters needed and click the “Run command” button to import the images / 3D volumes:



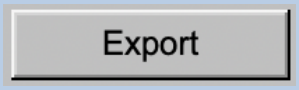
Click the “Close window” button to exit this additional window:



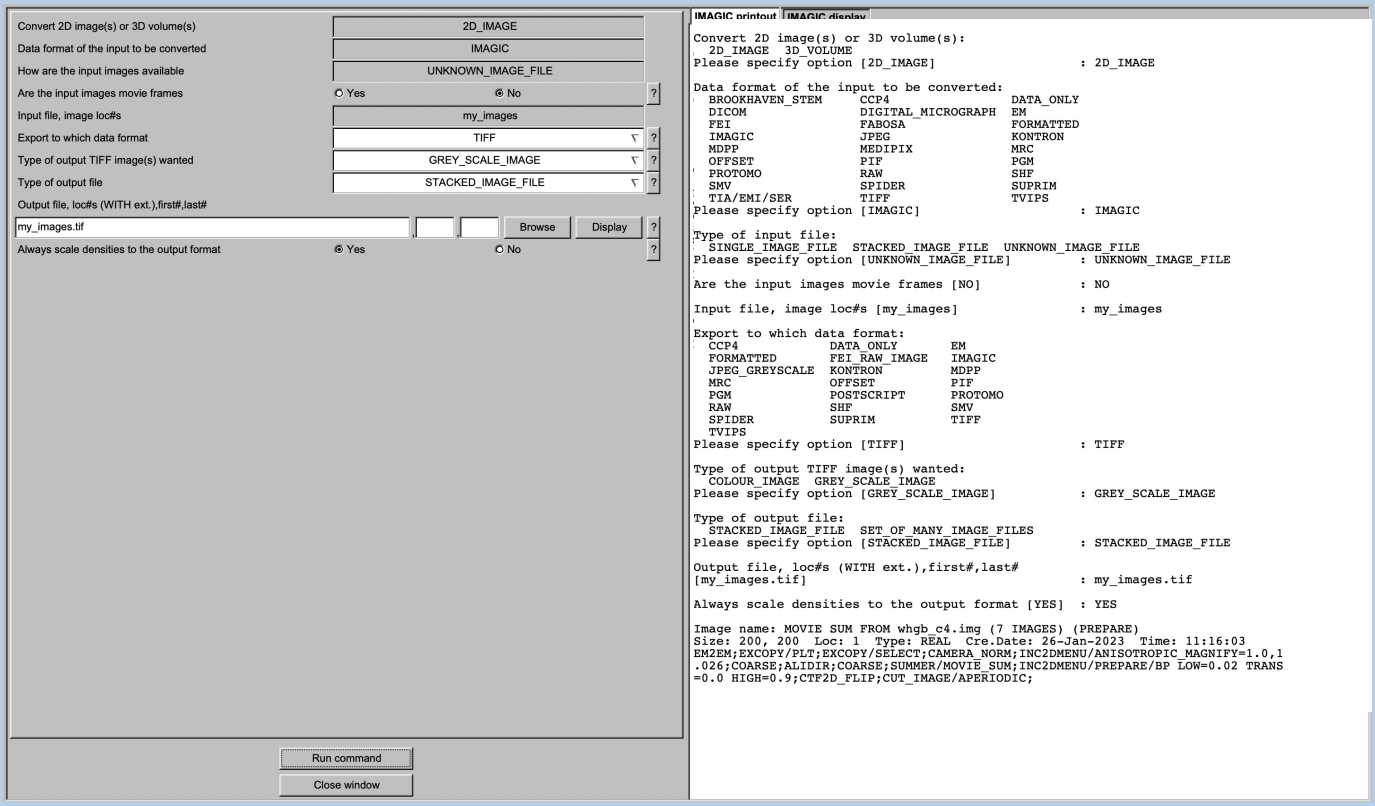
Refer to the **guiEM2EM** manual to get further help.

Export Buttons

You can export output images/3D volumes to any 3DEM format. Click the “Export” button which is located above the text field specifying the name of the related file.



An additional “IMAGIC EM2EM” page will open. Specify all parameters needed and click the “Run command” button to export the images / 3D volumes:



Click the “Close window” button to exit this additional window:

Refer to the **guiEM2EM** manual to get further help.

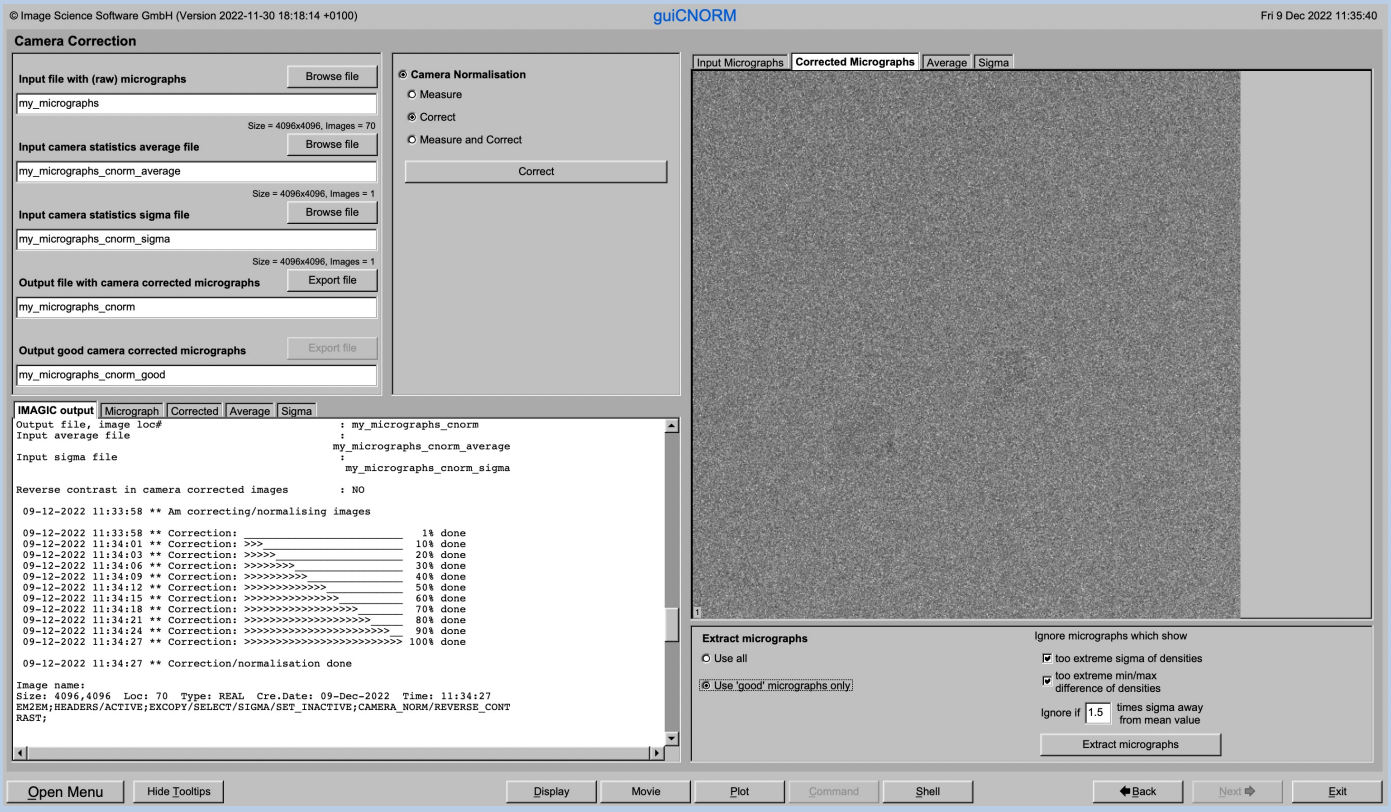
A Typical Page

A typical **IMAGIC GUI program** page has three columns.

The left part contains the file information and a kind of terminal window showing the print-out of the currently running IMAGIC program(s). In additional tabs you can find the control windows to adjust the displays on the left hand side.

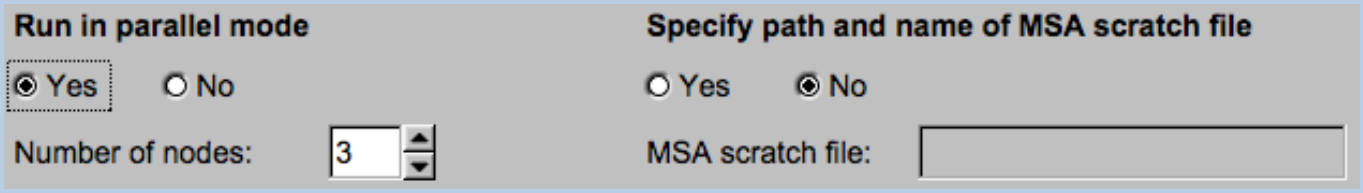
The middle part usually contains parameters to be specified and a single or a number of “Run” buttons to start the calculation(s).

The right part displays input and output images. Sometimes it can also contain additional follow-up calculations and the related “Run” buttons.

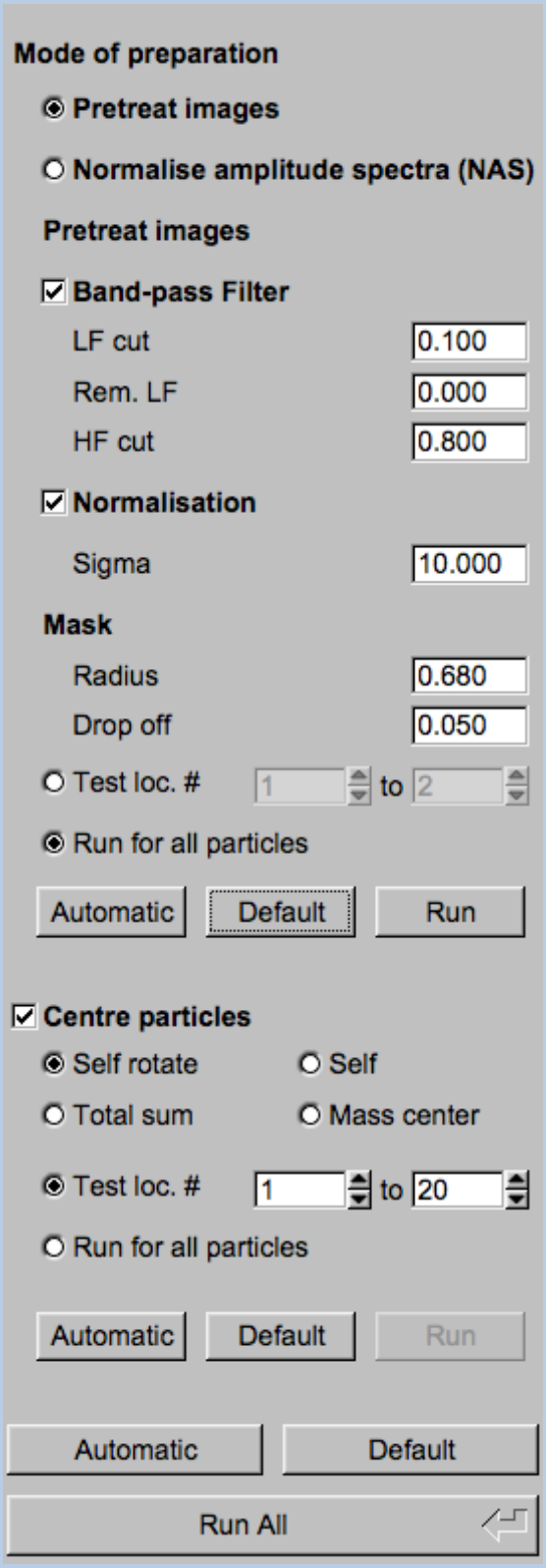


A Typical Page - MPI Parallel

If calculations can run in parallel mode the left part of a typical **IMAGIC GUI program** page also shows the buttons to specify the related parameters.

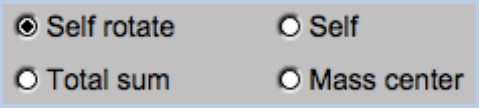


A Typical Page - Program Parameters

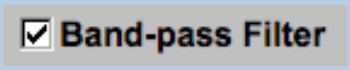


In the middle part of a typical **IMAGIC GUI program** page you will find the program parameters to be used.

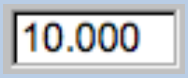
Radio Buttons are showing options.
One option only has to be used.



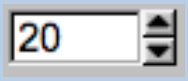
Click buttons are showing options which you can use or not.



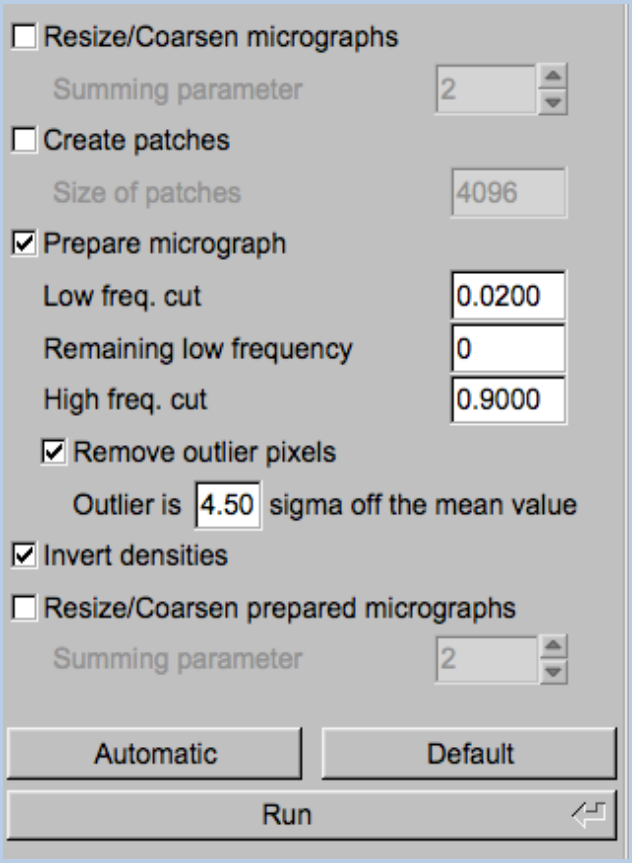
In text fields you can type in the wanted value. If the needed value is a number you can also move the cursor into this field, press the mouse key and keep it pressed and move the cursor to change the value.



There are also boxes where you can use up and down arrows to change the value.

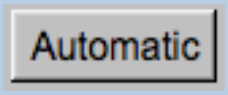


A Typical Page - Automatic / Default

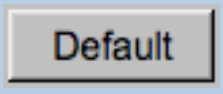


In the middle part of a typical **IMAGIC GUI program** page you will also find “Automatic” and “Default buttons.

Pressing the “Automatic” button will fill in the values suggested by IMAGIC.

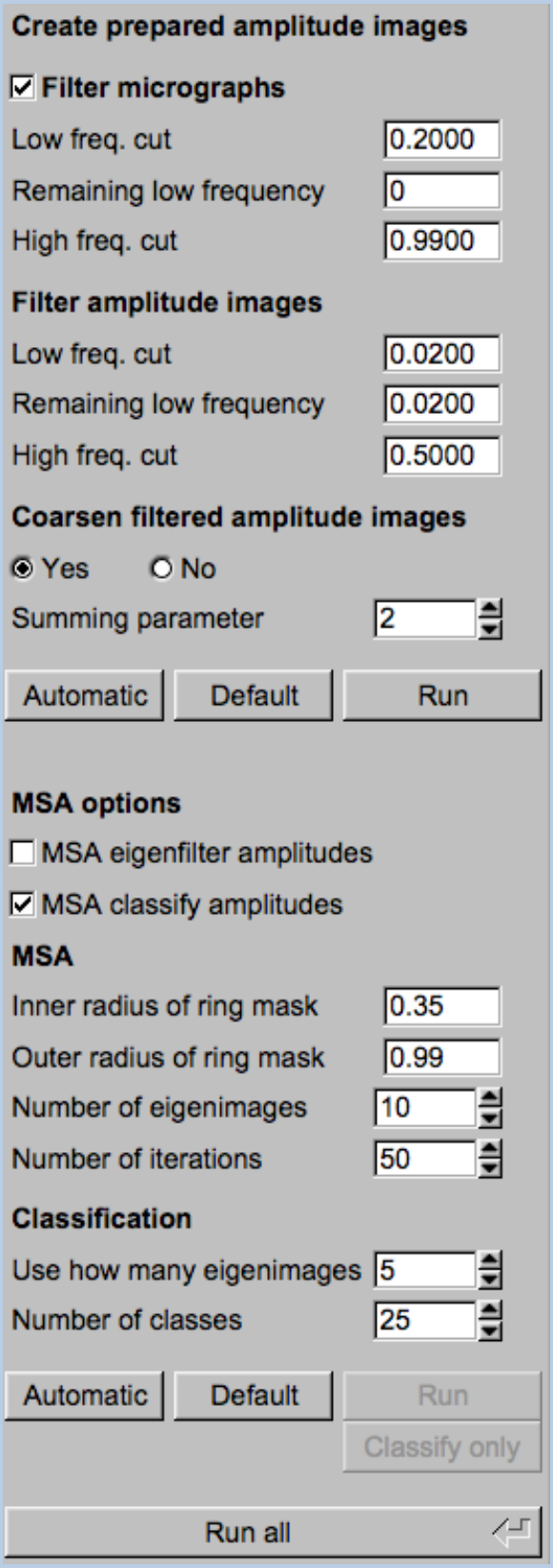


Pressing the “Default” button will fill in the values which you have used during the last “Run”.

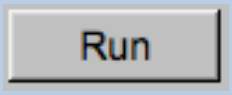


The values shown when entering a page are the default values (your last values given) if they are available. Else the automatic values are shown.

A Typical Page - Run buttons



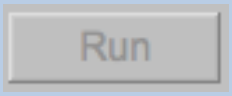
To run the calculations press the “Run” button.



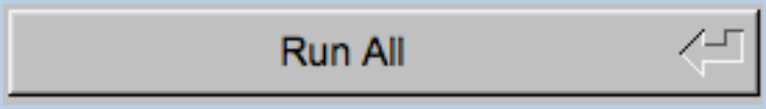
On a number of pages the calculations can be split. In this case you will find more than one single “Run” button.

Not running everything at once can be helpful when testing parameters.

May be a certain “Run” button is not yet activated because it needs the results of calculations not yet done.



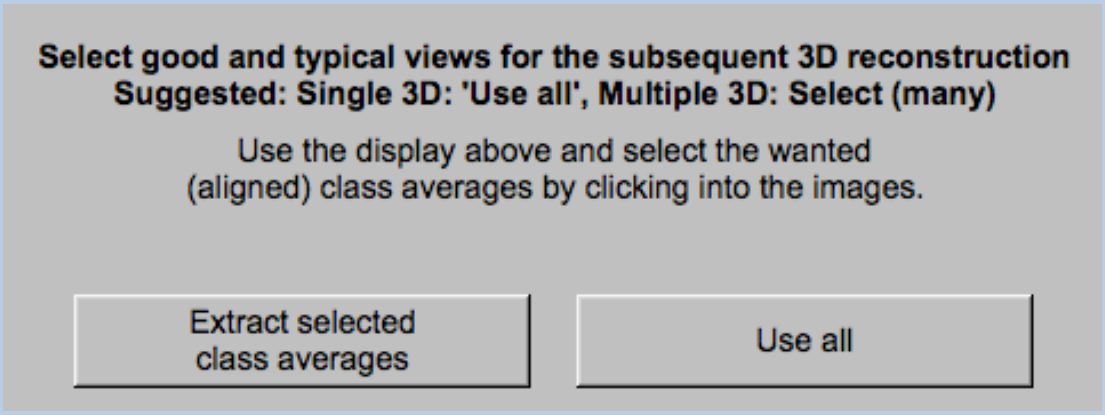
Pressing the “Run All” button starts all calculations currently activated on the page.



You can abort a running program by pressing the “Abort” button.

A Typical Page - Additional Tasks

The main calculations on the page are done using the middle part of an typical **IMAGIC GUI program** page. But on a number of pages some additional calculations have to be done. Please follow the instructions given.



Note that the new output images are usually shown in a new display tab.

A Typical Page - “Terminal Window”

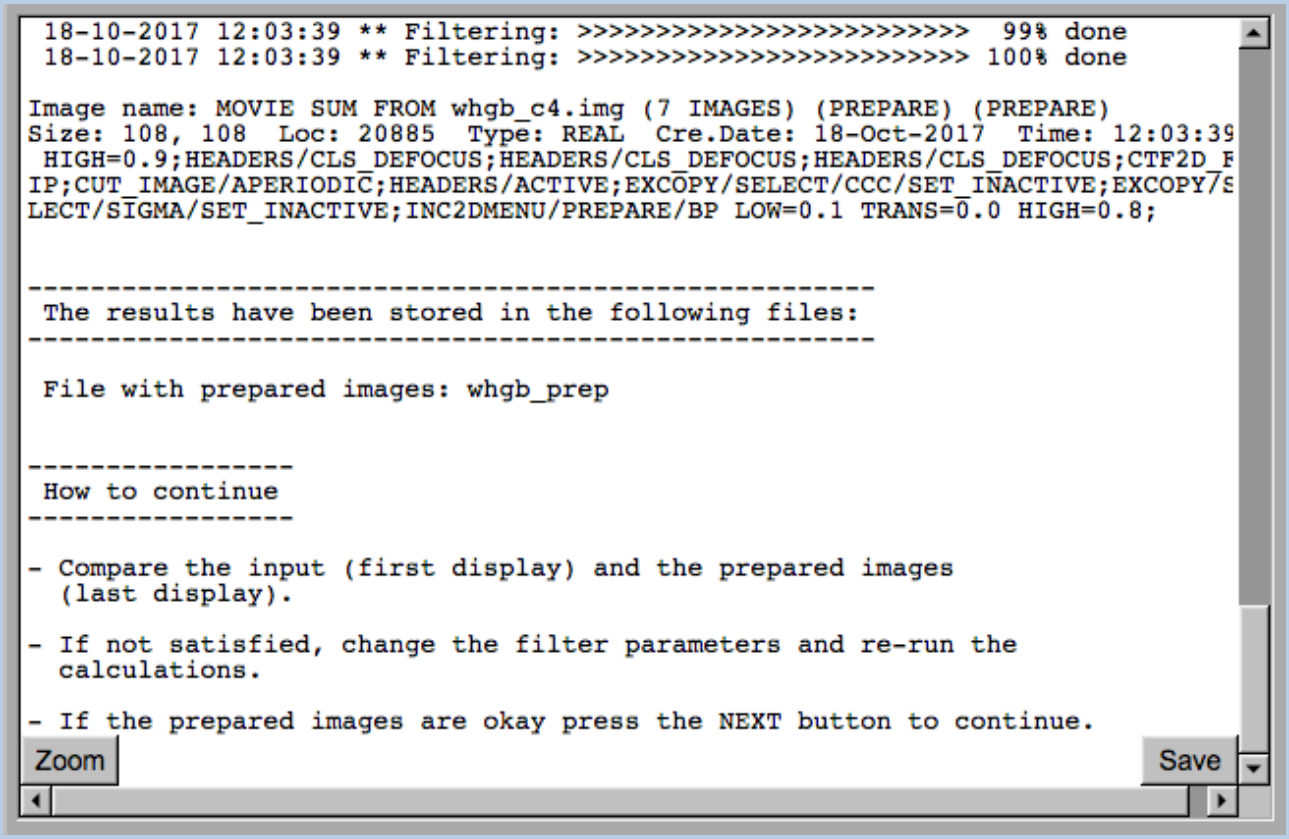
All print-out of an IMAGIC program started within the current **IMAGIC GUI program** page is shown in a kind of terminal window on the left hand side.

Most of the programs will end with a ”How to continue” giving some hints on how to check the results and on how to continue.

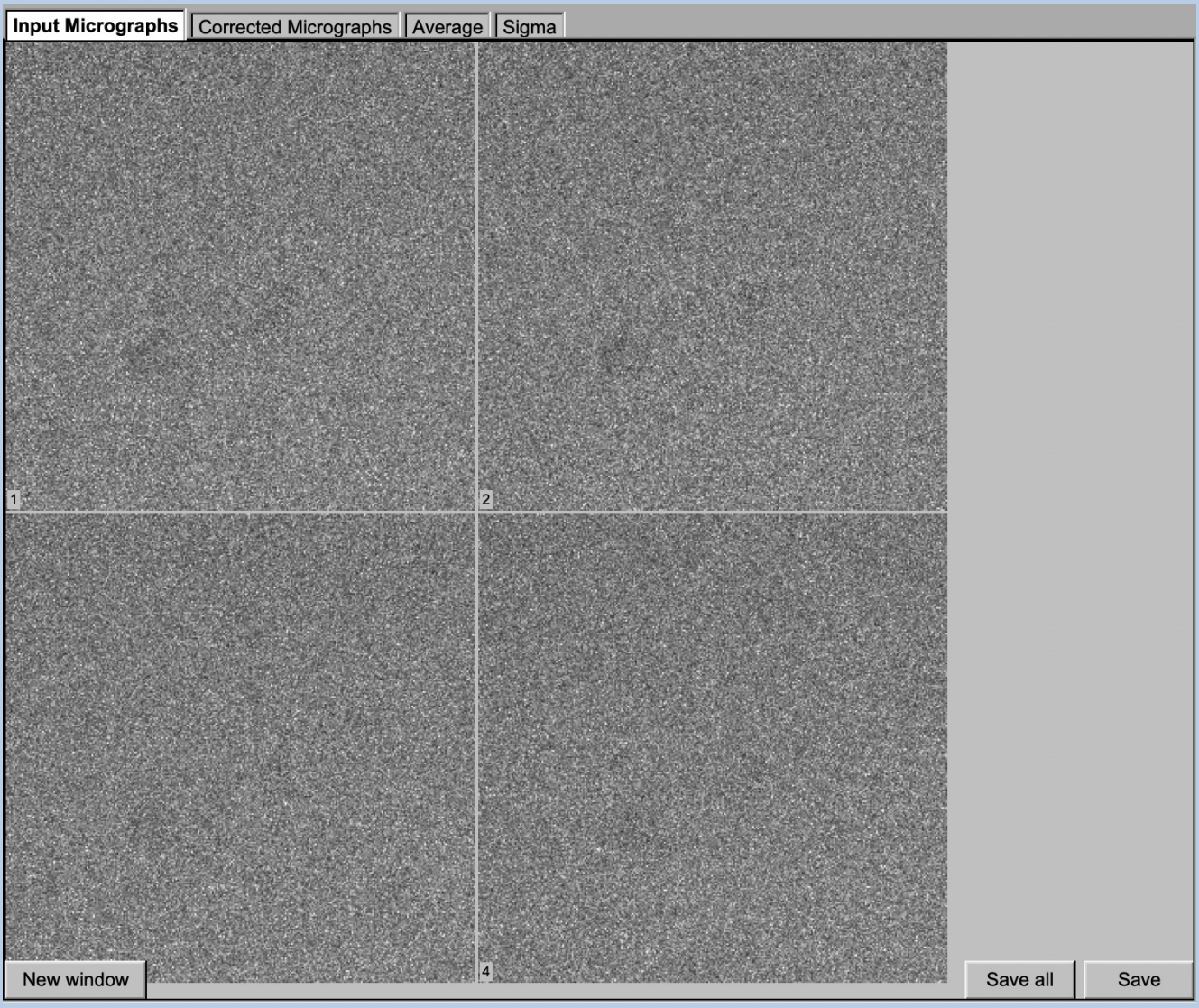
You can use the “Save” button to store the print-out in a text file.

With the “Zoom” button you can open a separate larger window showing the print-out.

Note that the “Save” and “Zoom” buttons are only visible when the cursor is moved into the terminal window.



A Typical Page - Display



In the right part of a typical **IMAGIC GUI program** page you will find displayed images - usually the input and the output images.

You can press the tabs to toggle between the various displays.

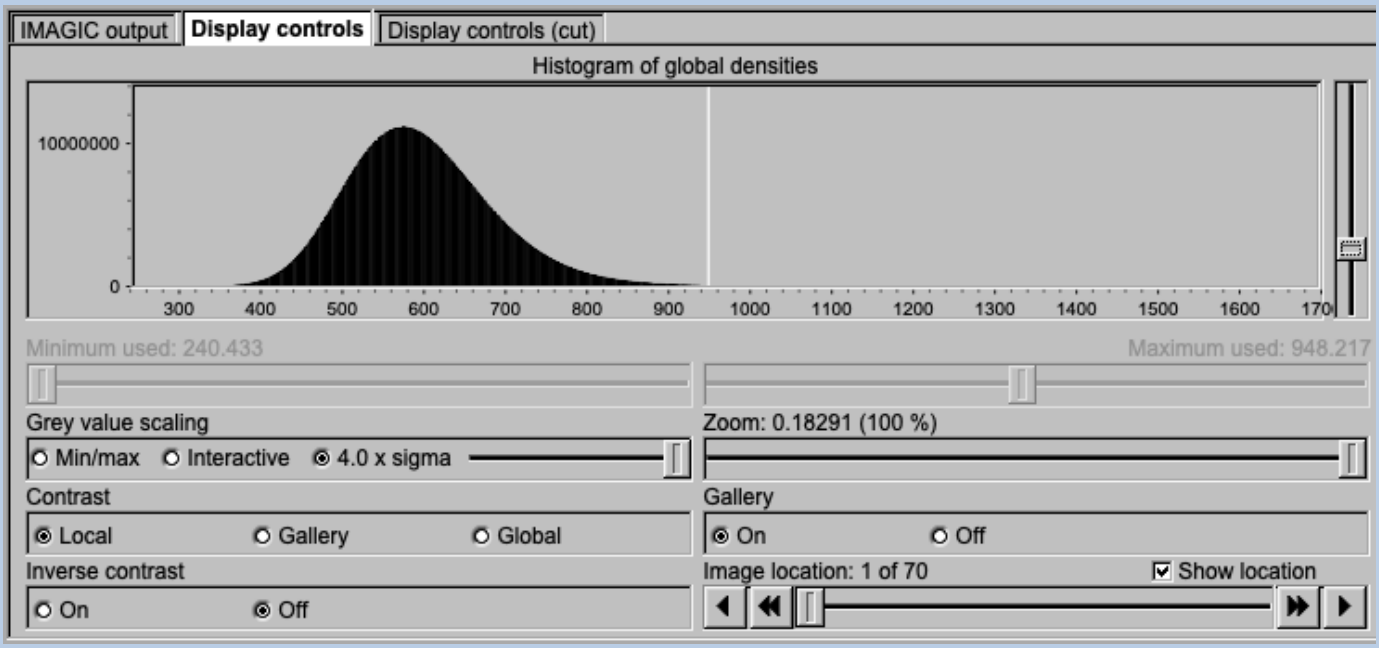
Double click into the wanted images or use the “New Window” button to get an enlarged display window. Use “Save” to store the display (JPG).

To adjust the display settings use the related display control tab on the left hand side of the page. Refer to **guiDISPLAY**.

A Typical Page - “Display Control” Tabs

The visualisation settings of the images shown on the right-hand side of each **IMAGIC GUI program** page can be adjusted in its own related “Display control” tab on the bottom left part of each page. Also refer to **guiDISPLAY**.

Grey value scaling:	Adjust the contrast	
	Min/Max:	Scale the grey-values to minimum/maximum
	Interactive:	Set the limits by giving numbers
	Sigma:	Use an amount of sigma to set the limits
Contrast	How to calculate the grey value scaling	
	Local:	Calculated in each image separately
	Global:	Calculated using all image densities (as displayed in the histogram)
	Gallery:	Calculated in the currently displayed images
Inverse contrast:	Use one of the radio buttons	
Zoom	Enlarge the displayed images	
Gallery	On	Display the images in a gallery (may be you need another zoom to see more than one image)
	Off	Show only one image
Image Locations.	Use the slider or the arrows to select image locations	



A Typical Page -“Plot Control” Tabs

The visualisation settings of curves/spectra is shown on the right-hand side of an **IMAGIC GUI program** page can be adjusted in its own related “Plot control” tab on the bottom left part of each page. Also refer to **guiPLOT**.

Style, Colour, Grid: Adjust the curve line style, the colour and add a grid if wanted

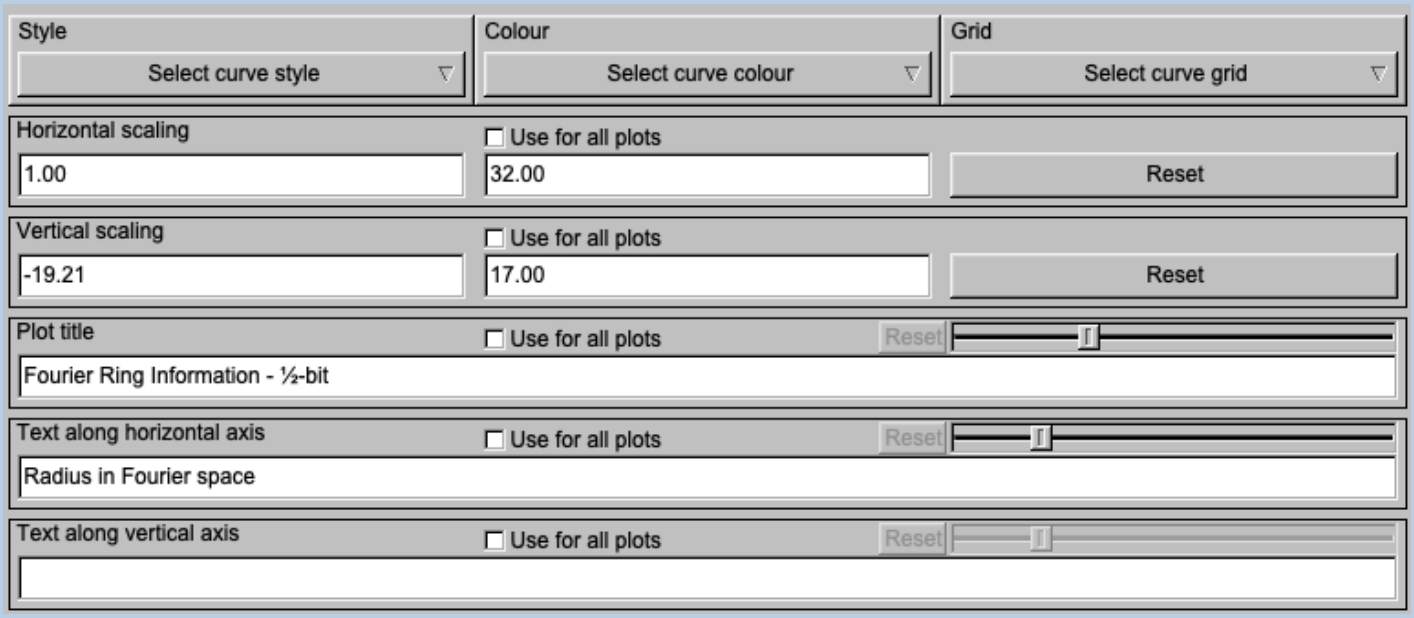
Horizontal, vertical scaling: Set minimal and maximal horizontal or vertical limits

Plot title Set the text of the plot title

Text along ... Set the text along the given axis

Use for all plots: Use the setting for all plots in a file independent of of what is input in the PLT file

Reset:. Reset to the automatic values

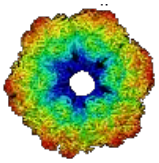


A Typical Page - The Toolbar

There is a toolbar at the bottom of each **guiPICK** page.

The toolbar buttons:

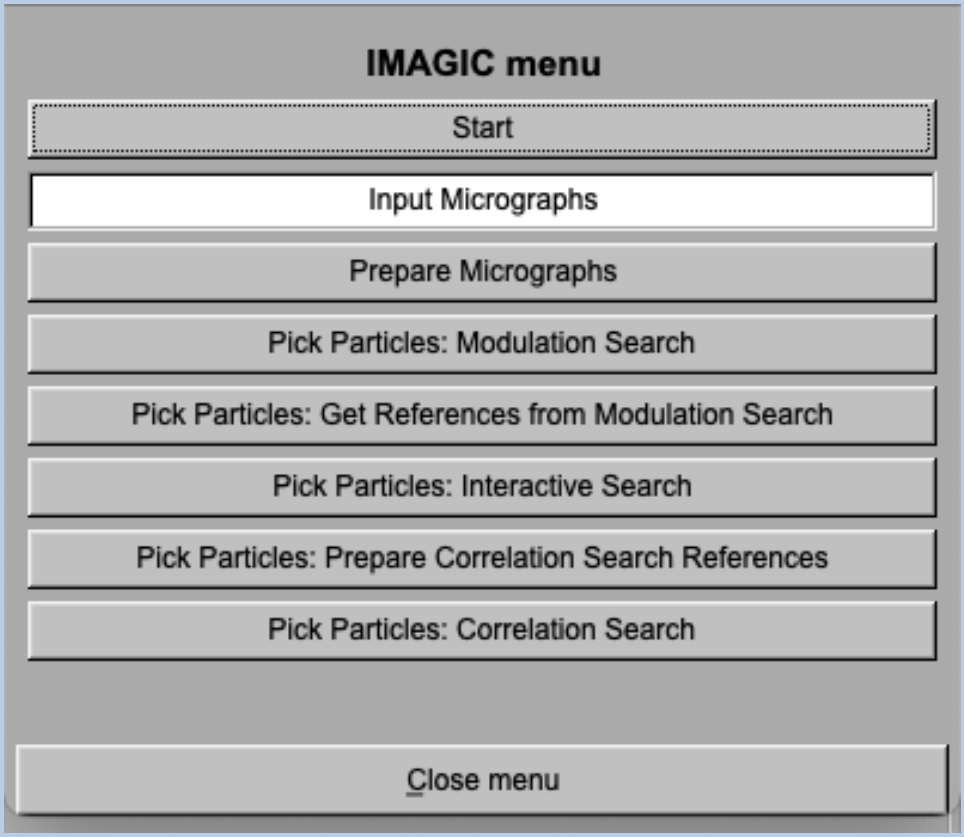
Open Menu	Open the MENU to navigate to each page wanted
Hide Tooltips Show Tooltips	Show or hide the context sensitive tooltips (the help text may sometimes disturb)
Display	Open a DISPLAY page to visualize IMAGIC images. Refer to **guiDISPLAY**.
Movie	Open a MOVIE page (display in an endless loop). Refer to **guiDISPLAY**
Plot	Open a PLOT page to show IMAGIC curves. Refer to **guiPLOT**
Colour Mapping	Open a DISPLAY page to visualize IMAGIC images using a colour map stored in another input.
Command	Open a list to run any IMAGIC command. Refer to **guiIMAGIC**.
Shell	Run a shell / terminal page. command
Back	Go to the previous page
Next	Continue with the next page
Exit	Exit **guiPICK**



IMAGIC

guiPICK

The guiPICK Menu



PAGES:

guiPICK:

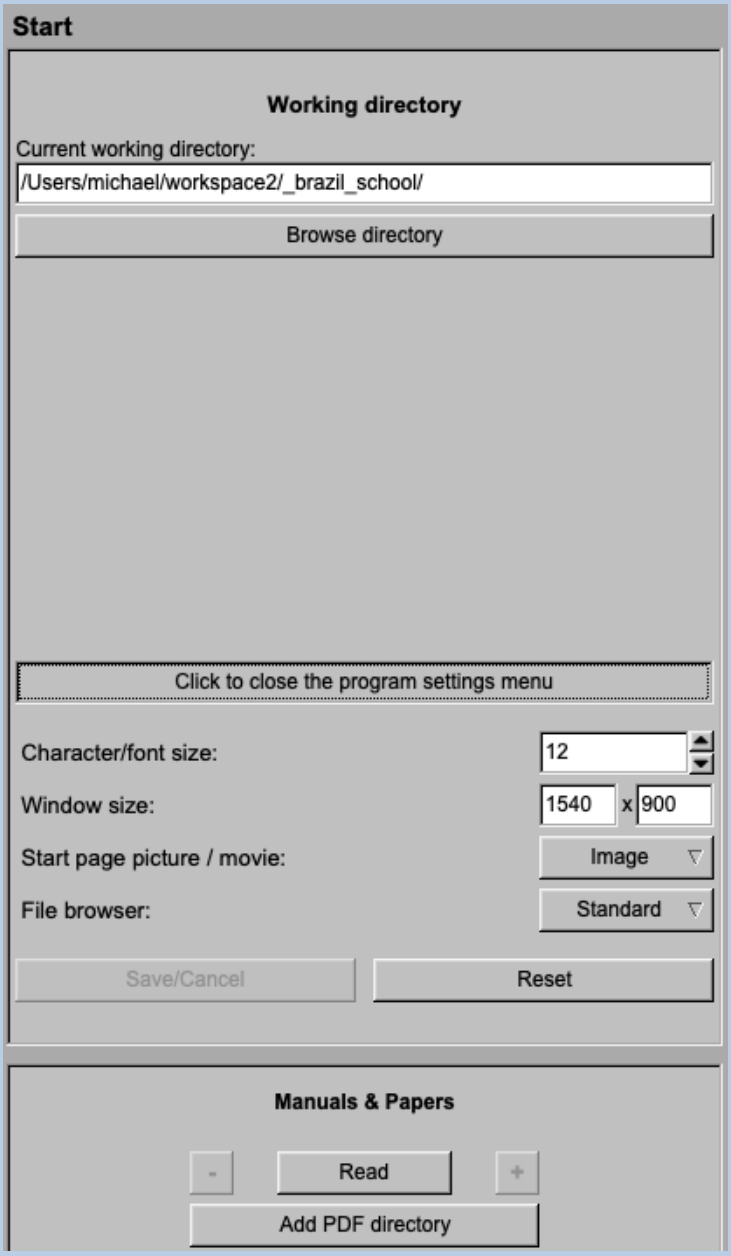
Import Micrographs:	Convert micrographs into IMAGIC format
Prepare Micrographs:	Pre-treat Micrographs
Modulation Search:	Modulation search and extract particles
Interactive Search:	Interactively search and extract particles
Get References from Modulation Search:	Select references from modulation search
Prepare Correlat. References:	Prepare references for correlation search
Correlation Search:	Correlation search and extract particles

General:

Start:	Page to adjust some program parameters
Close menu:	Close this menu and return to last page.

The “Start” Page

This page is not part of the **guiPICK** workflow and can only be reached using the “Back” or the “Open Menu” button(s).



On this page you can set some program parameters:

a) the working directory
b) the size of the **guiPICK** program windows and/or text (a re-start is needed)
c) the type of file browser

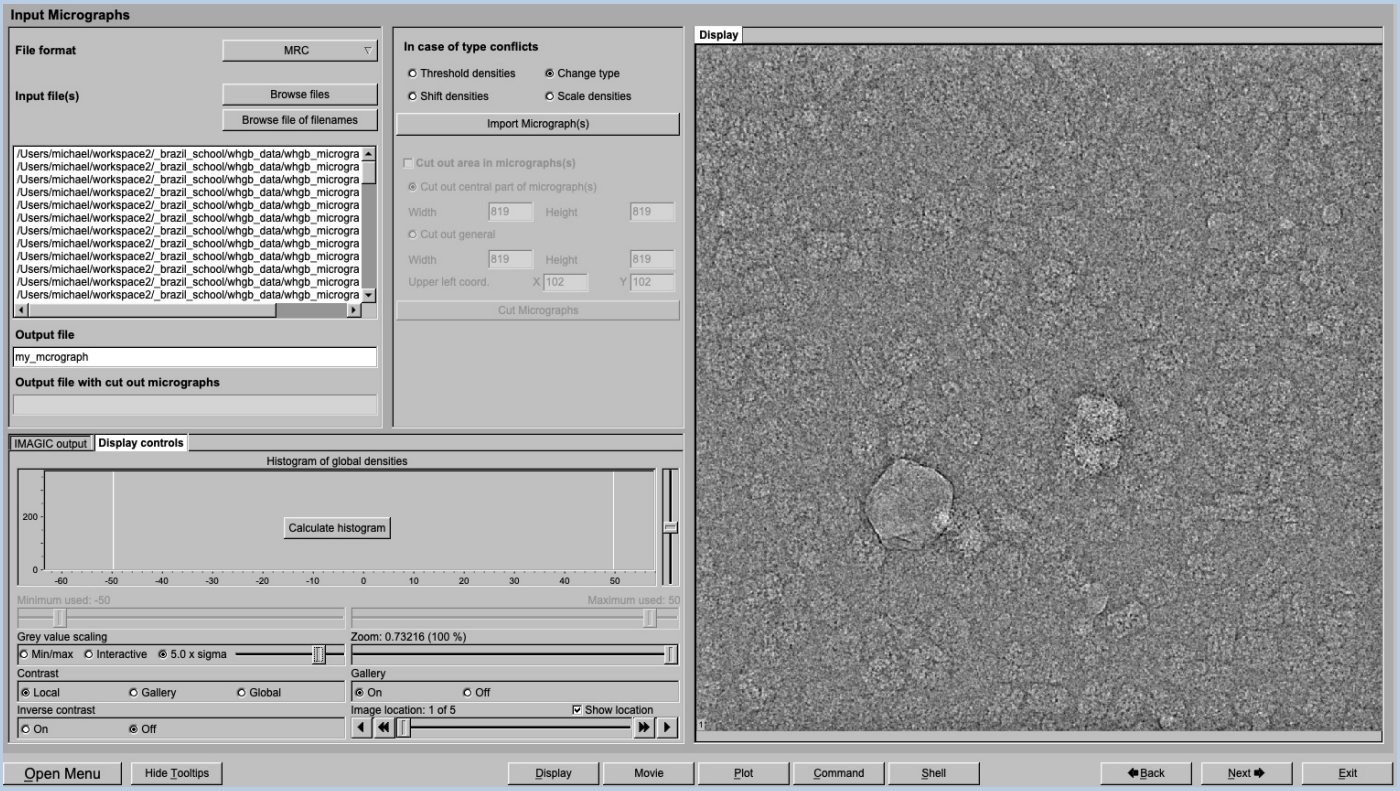
Start Working

The page **guiPICK** starts with the “Import Micrograph” page.

The workflow using the “Next” button will guide you through all **guiPICK** pages.

Use the “Back”, “Next” or “Open Menu” buttons to skip a page or to choose the wanted page.

The “Import Micrographs” Page



DESCRIPTION:

Convert import micrograph files using any 3D-EM format (or TIFF) into a single (stacked) IMAGIC image file.

The page can be skipped if your input images are already stored in IMAGIC format and if all electron microscopy parameters are already stored in the input headers.

If wanted you can cut-out parts of the input images. Not suggested for CTF correction.

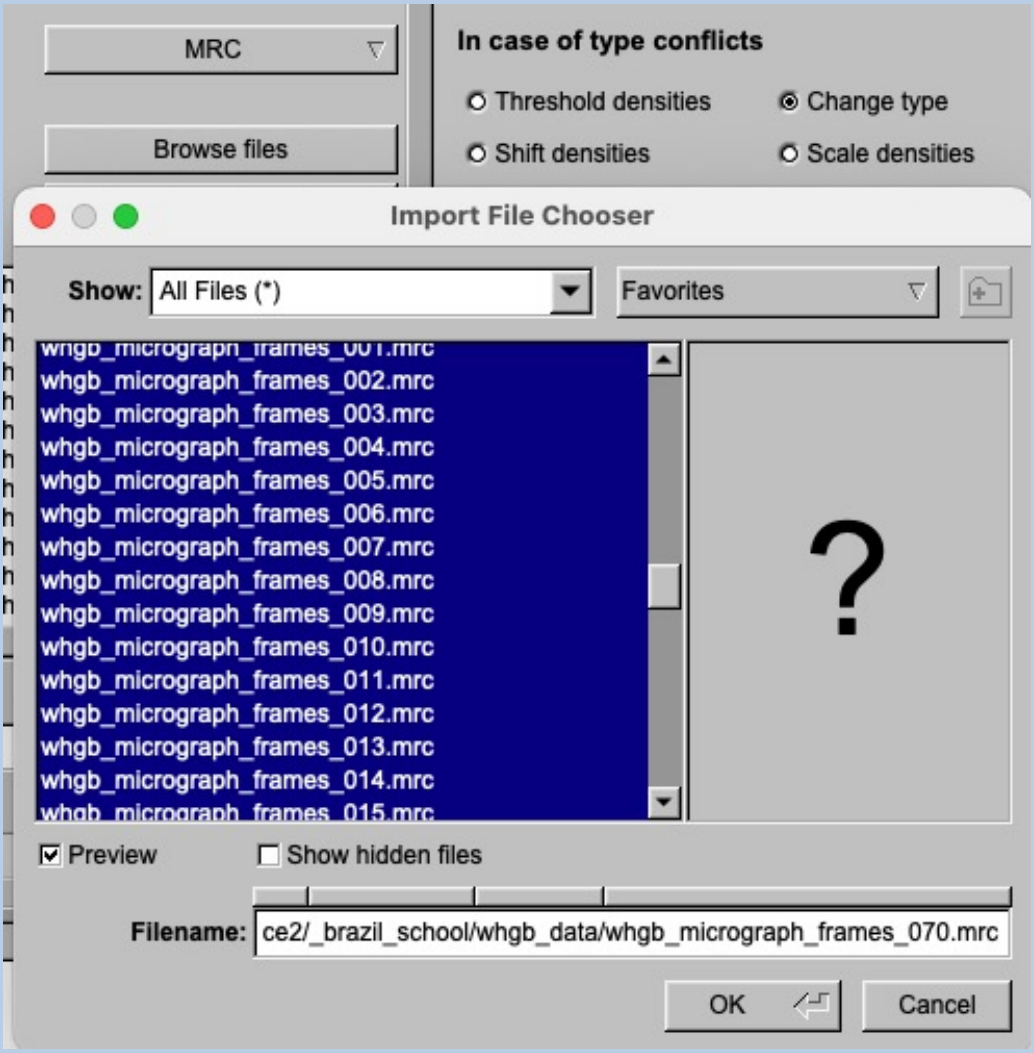
Also refer to program **guiIMPORT**.

IMPORT MICROGRAPHS:

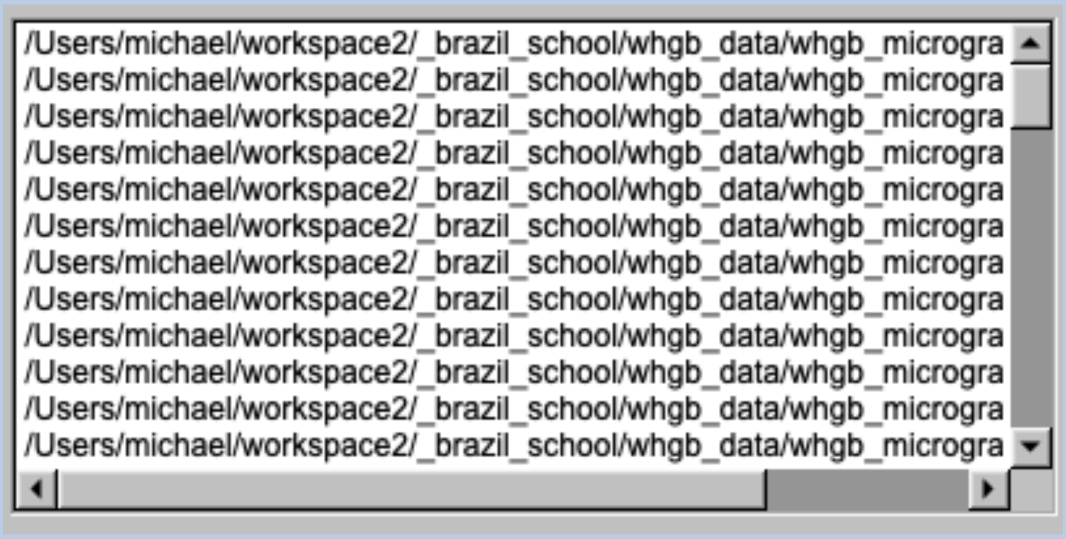
Specify the file format in which your input micrographs/images are stored. Click the “Select format” button

and choose one of the formats in the listing.

Now you can specify the input image files or a “File of filenames” text file(containing the names of the wanted input image files) with the “Browse” button. Refer to chapter “Input Files” and ”Input. File Chooser” for help.



If wanted you can edit the list of files. But be careful there is no automatic control of file names in this list.



Next, you need to specify the name of the output file which is the IMAGIC image file which will contain the imported image(s).

Depending on the format of the input images you have to specify a number of parameters or options.

Format MRC, for example:

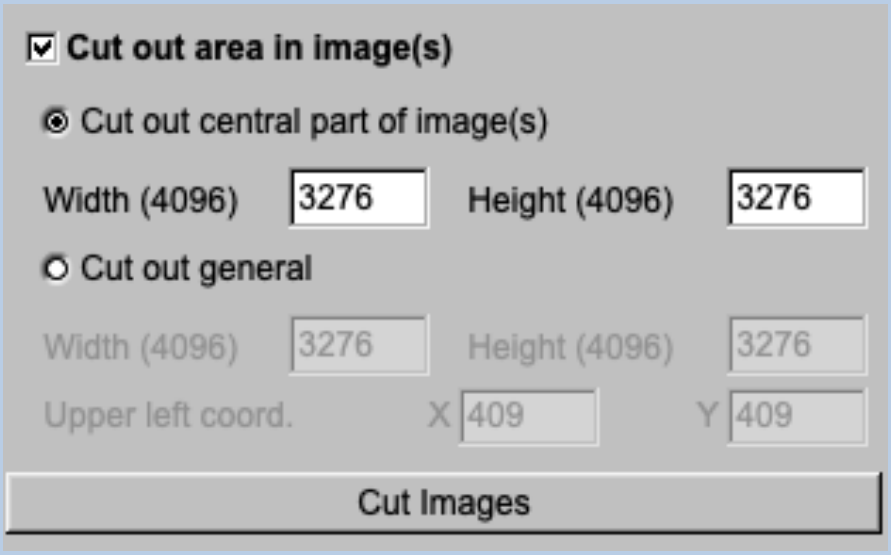
Having specified every information needed click the “Import Micrograph” button to start the import of the image(s).

The imported images are shown in the display tab on the right-hand side. See chapter “A Typical Page - Display control tabs”.

CUT MICROGRAPHS / IMAGES
(not suggested in **guiPICK**):

Having imported the input images, you may want to not use the full size of the images but only a part of them.

Clicking the “Cut out area of image(s)” option you can cut-out parts of the imported images:

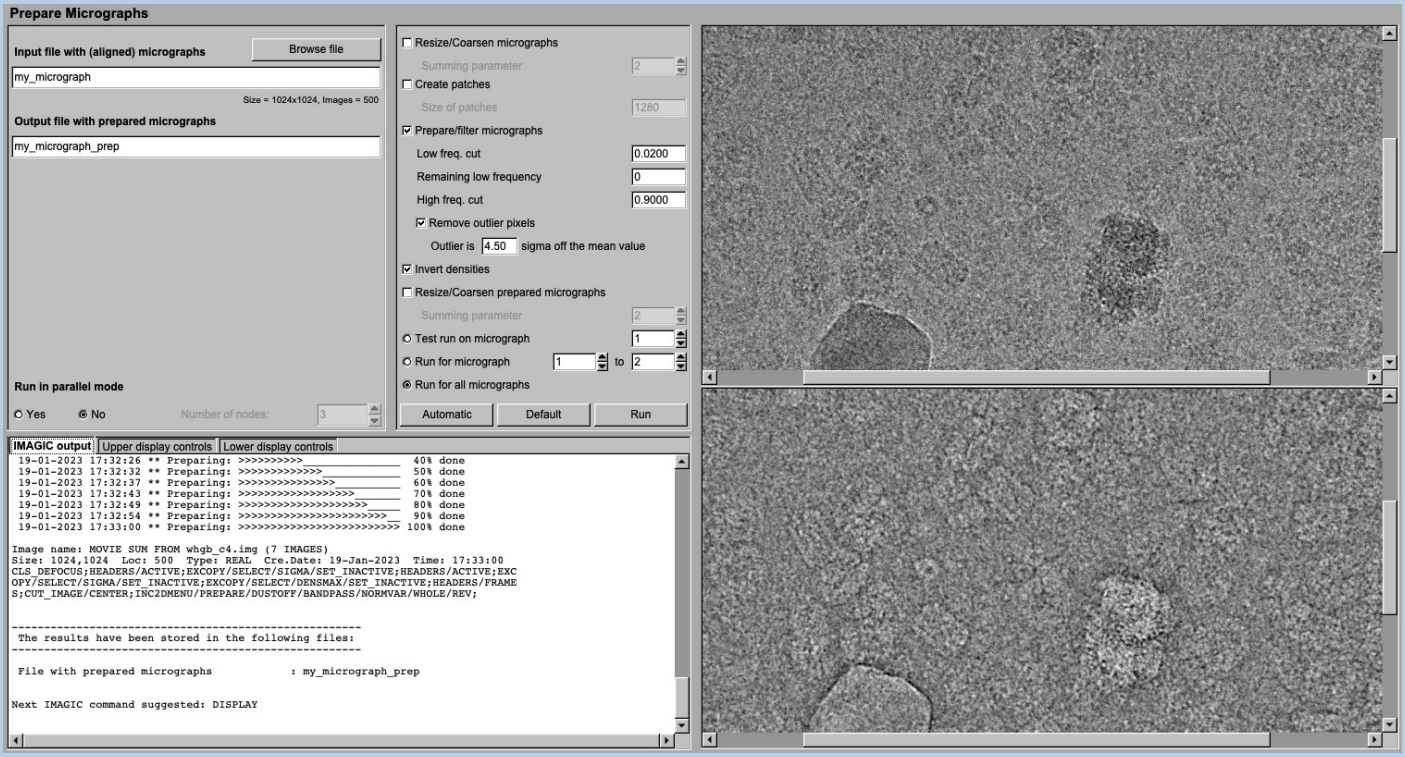


The chosen part is shown in the display window. You can cut-out a central part or any part wanted. The cut-out part is the same in all images, of course.

The name of the output file containing the cut-out images is suggested on the left-hand side. As usual you can change this name, of course.

Having specified everything click the “Cut Images” button to run the calculations.

The “Prepare Micrograph” Page



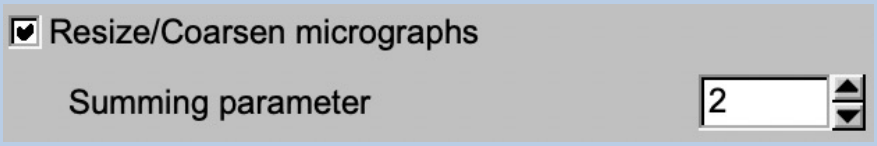
DESCRIPTION:

Usually it is necessary to pre-treat the input micrographs by imposing a band-pass filter. filter

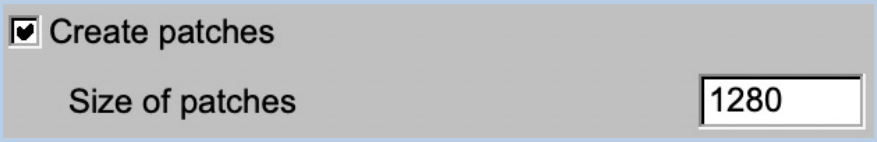
NOTE:
Of course, you can skip this page if no such treatment is wanted/needed.

Prepare the micrograph images for CTF determination

You can resize the micrograph images

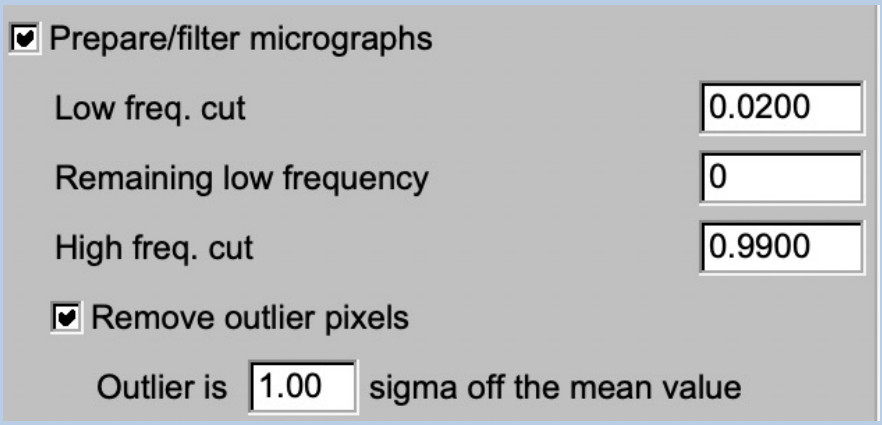


or create patches

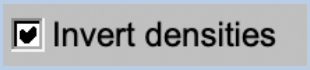


to speed up the CTF calculations.

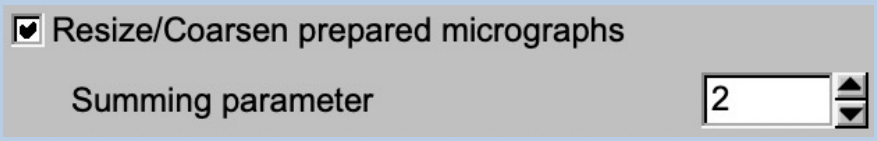
Imposing a band-pass filter is always suggested:



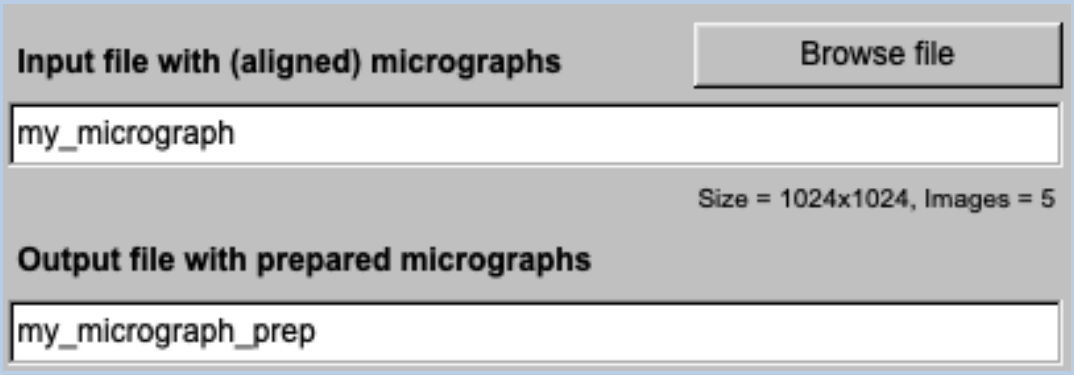
If wanted you can also invert the contrast although this does not change any CTF calculation.



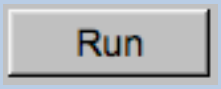
Finally, you can once more resize the pre-treated micrographs:



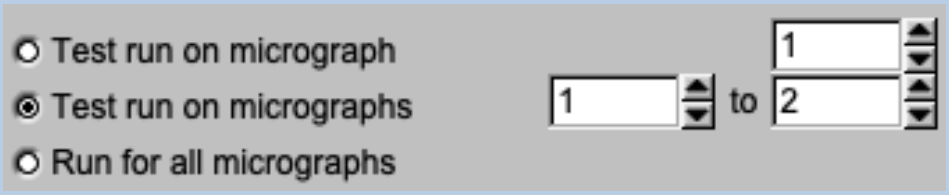
As usual, specify the names of the input and the output files:



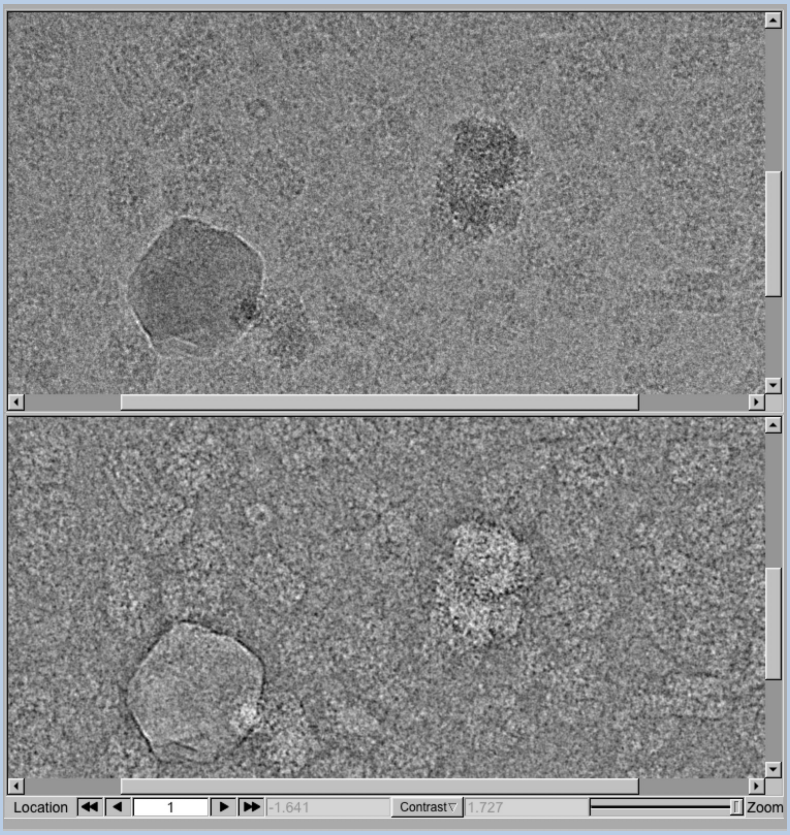
Start the calculations by clicking the “Run” button:



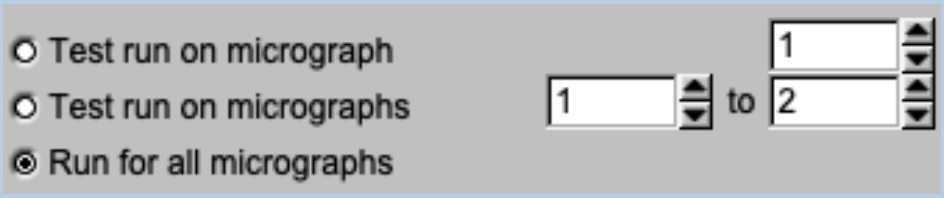
Play around with the parameters running movie alignment on a single or a small range of micrographs.



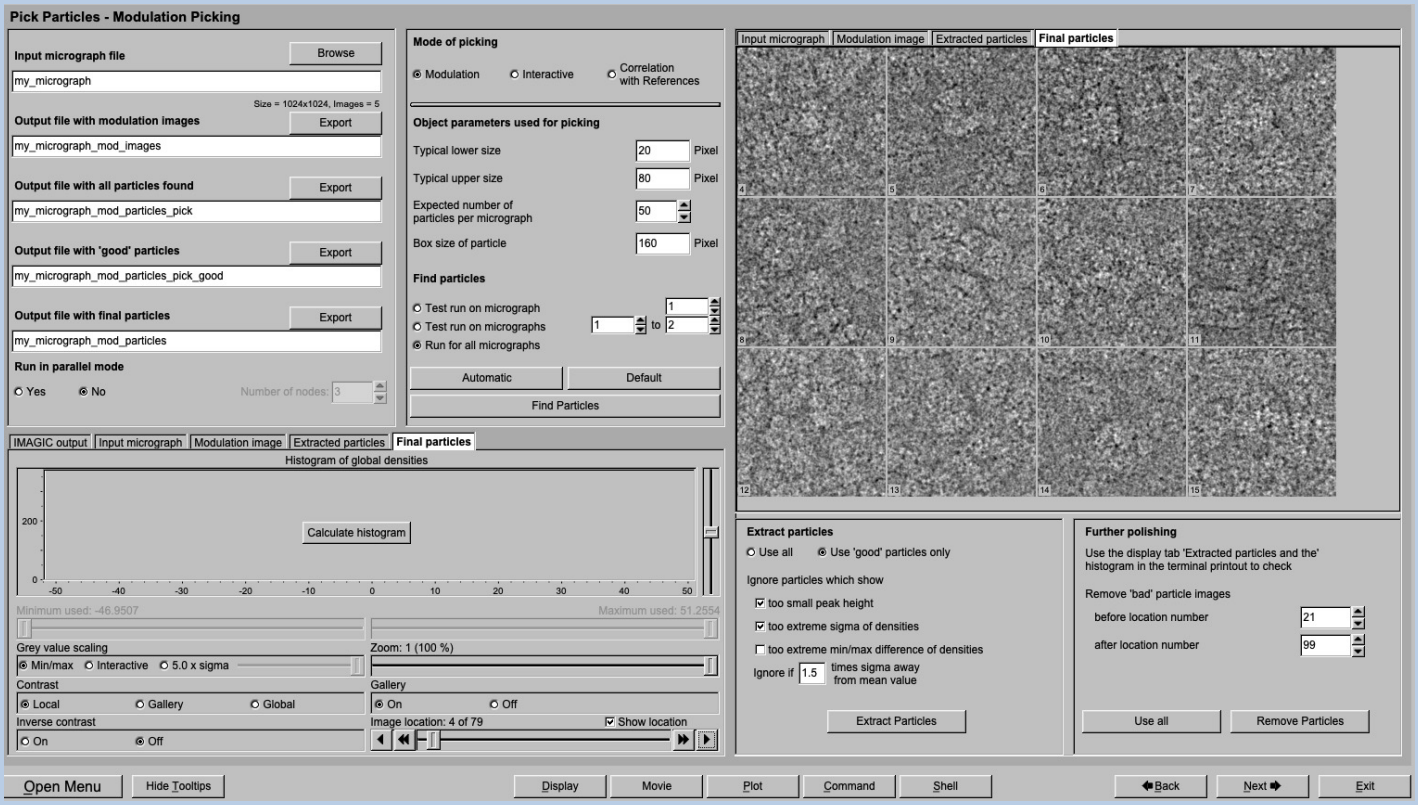
Check the pre-treated micrographs:



If all parameters are adjusted and the pre-treated micrographs look okay run the calculations for all micrographs:



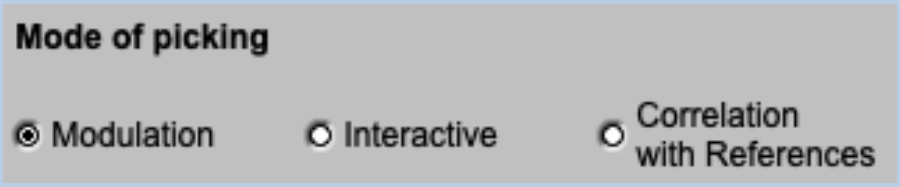
The “Pick Particle - Modulation Search” Page



DESCRIPTION:

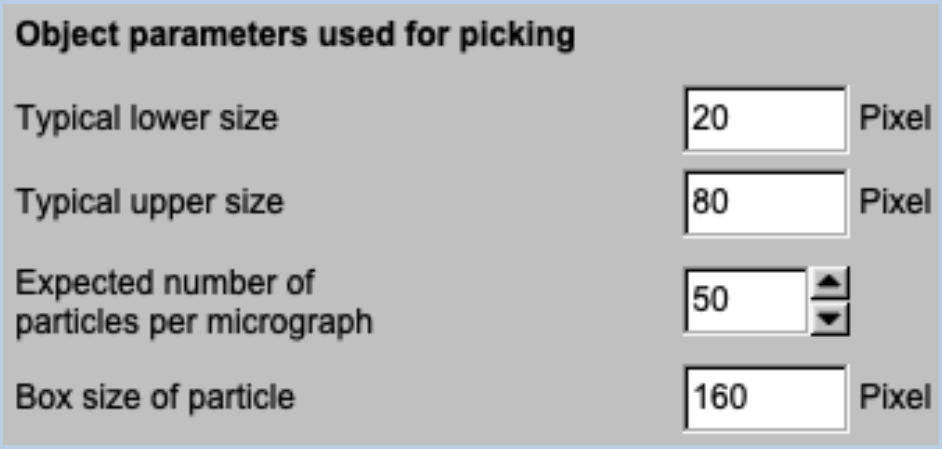
Find particles by modulation search. Extract (cut-out) particle images.

Mode of picking is modulation search:

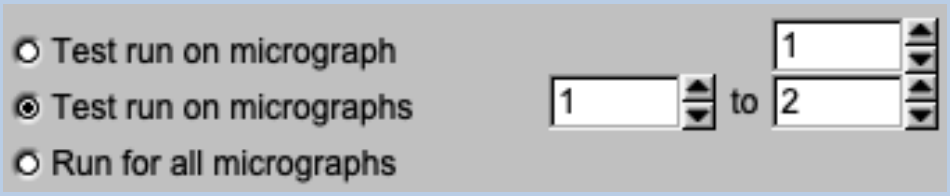


But, if course, you can choose an other mode of picking which will lead you to another picking page.

In modulation search, specify some parameters. Move the cursor over any input box to get help.



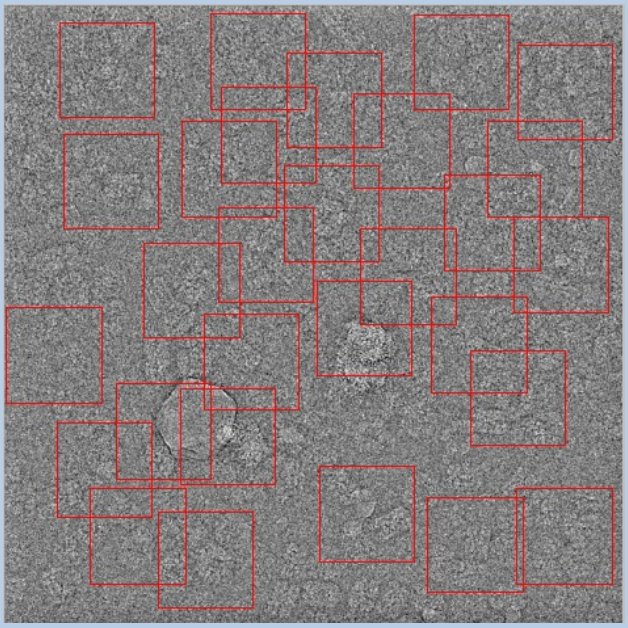
First search particles in a single or in a small number of micrographs to check the parameters:



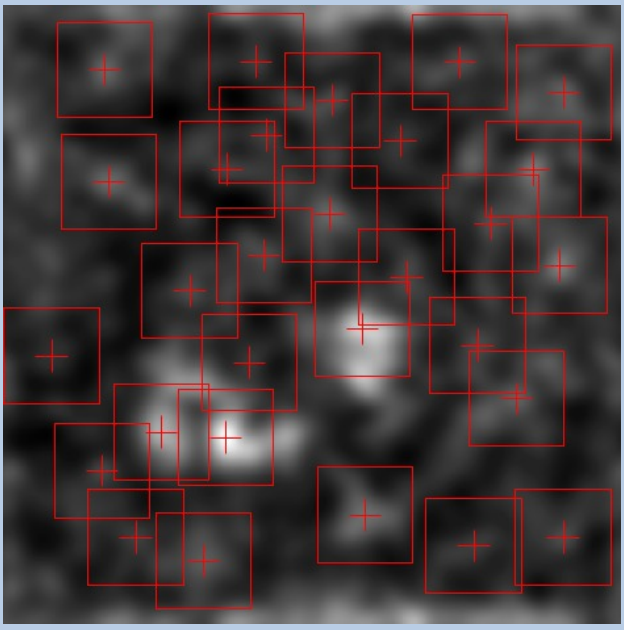
Click the “Find Particles” button to start the modulation search:

Play around with the search parameters and compare the results.

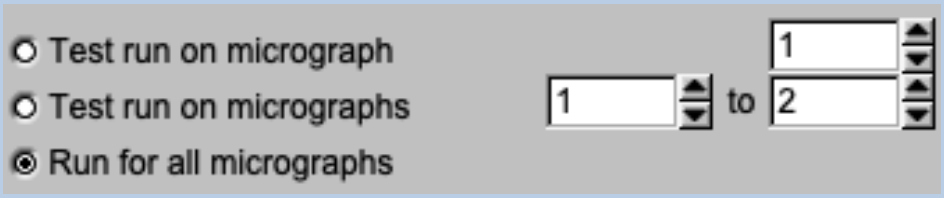
Check the particles found in the displayed micrographs:



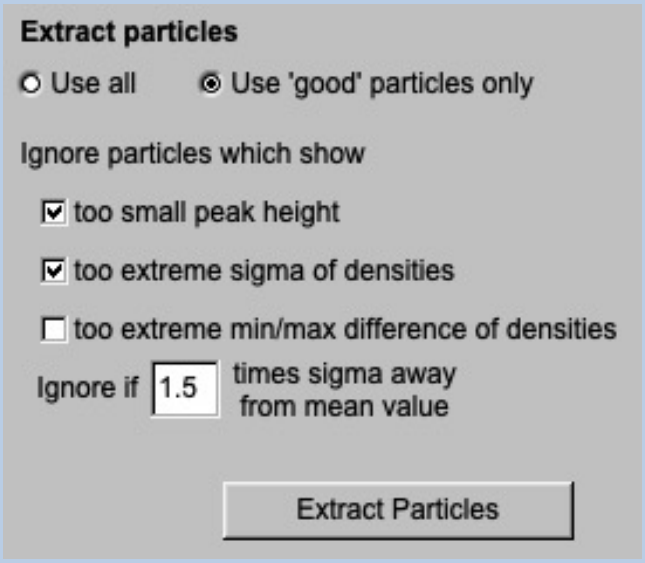
Also have a look at the modulation images:



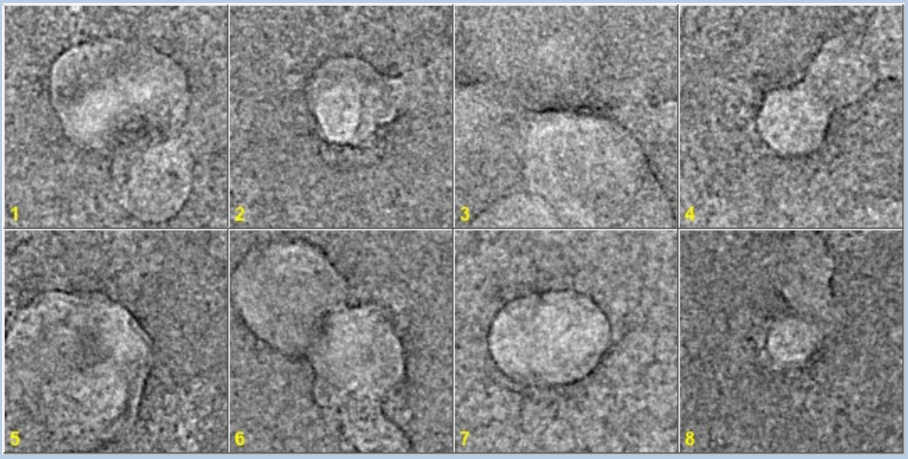
Having found the best search parameters run the modulation search for all micrographs.



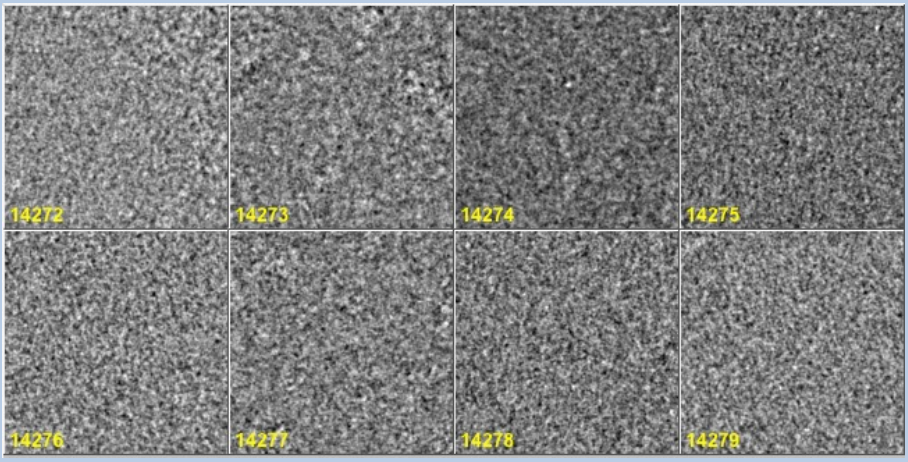
Now the particles can be extracted. Particles found using modulation search usually contain a lot of junk (ice, carbon foil, clumped particles). In a first approach, they can be sorted out by looking at the statistics of the picked particles:



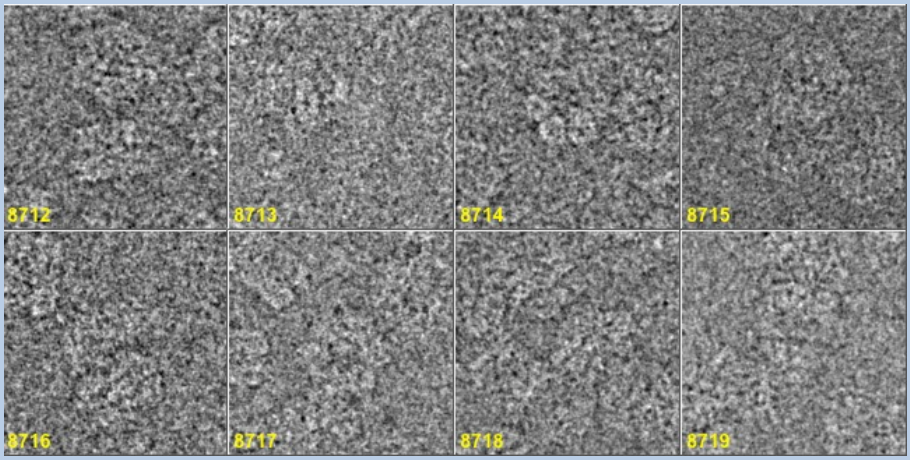
Check the extracted particles displayed on the right-hand side. You can see that the first displayed images show ice blobs etc.



whereas the last images usually contain noise:



The particle images are in between:

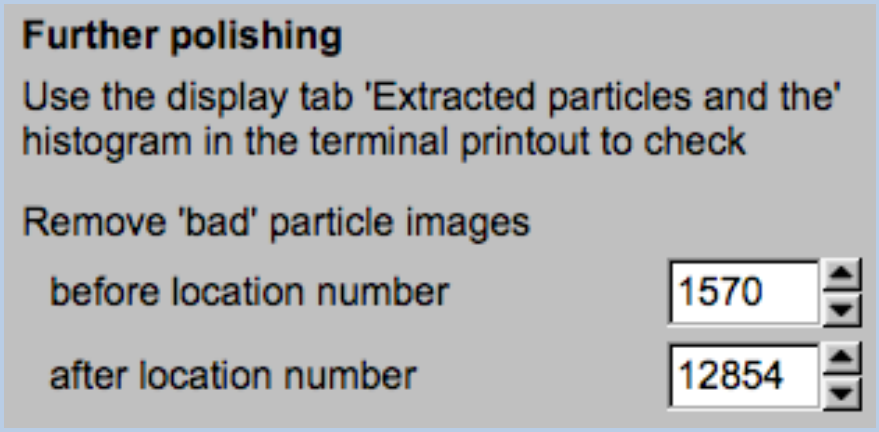


Check the extracted particles and write down the location numbers where the good particle images start and where they end.

Also have a look at the histogram printed in the terminal window to get an idea where to find this range of good particle images

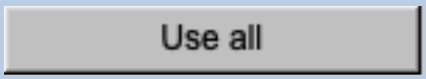
```
Histogram of CCCs from whgb_mod_particles_pick

14279      0      0   3.43E-02 |
14277      2      2   5.01E-02 |
14258     21     19   5.81E-02 |
14200     79     58   6.60E-02 |*
14081    198    119   7.39E-02 |***
13887    392    194   8.18E-02 |*****
13596    683    291   8.98E-02 |*******
13089   1190    507   9.77E-02 |************
12326   1953    763   1.06E-01 |******************
11215   3064   1111   1.14E-01 |***************************
 9777   4502   1438   1.21E-01 |**********************************
 8112   6167   1665   1.29E-01 |****************************************
 6502   7777   1610   1.37E-01 |**************************************
 5136   9143   1366   1.45E-01 |********************************
 3984  10295   1152   1.53E-01 |***************************
 3117  11162    867   1.61E-01 |********************
 2460  11819    657   1.69E-01 |***************
 1998  12281    462   1.77E-01 |***********
 1640  12639    358   1.85E-01 |********
 1360  12919    280   1.93E-01 |*******
 1137  13142    223   2.01E-01 |*****
  965  13314    172   2.09E-01 |****
  842  13437    123   2.17E-01 |***
  706  13573    136   2.25E-01 |***
  602  13677    104   2.32E-01 |**
  518  13761     84   2.40E-01 |**
  449  13830     69   2.48E-01 |**
  375  13904     74   2.56E-01 |**
  316  13963     59   2.64E-01 |*
  271  14008     45   2.72E-01 |*
  218  14061     53   2.80E-01 |*
  188  14091     30   2.88E-01 |*
  147  14132     41   2.96E-01 |*
  118  14161     29   3.04E-01 |*
  102  14177     16   3.12E-01 |
    0  14279    102   3.28E-01 |**

Low values binned at  lower edge : 0
High values binned at higher edge: 97

Meaning of columns: # remaining, # accumulated, # in this bin, bin value
```


Specify the first and last image number (location of the ‘good’ particles images:

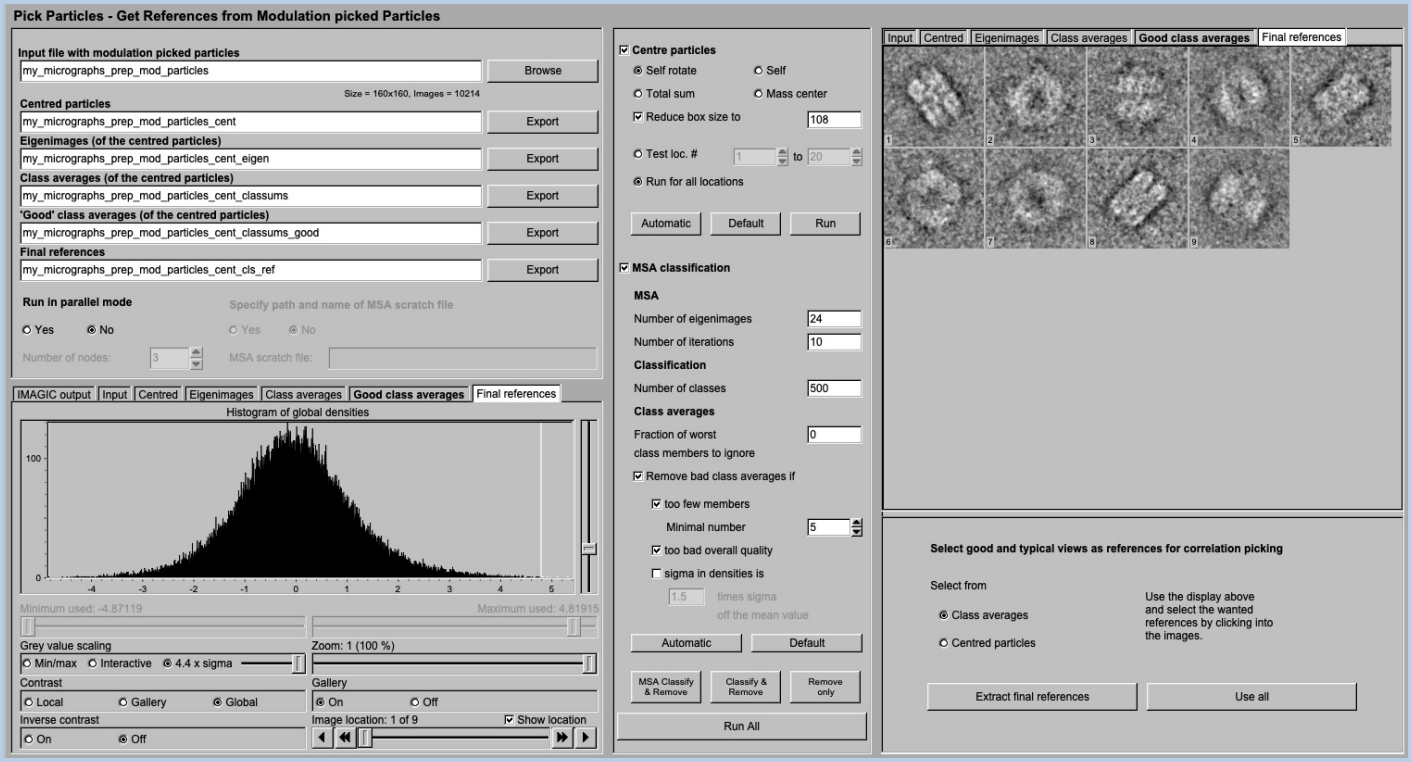


Extract the final ‘good’ particle images by clicking the “Remove Particles” button:

Of course, you don’t have to remove particles. In this case (usually not suggested) click the “Use all” button.



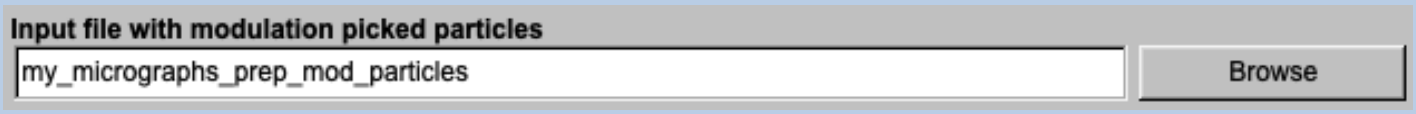
The “Pick Particle - Get References from Modulation picked Particles” Page



DESCRIPTION:

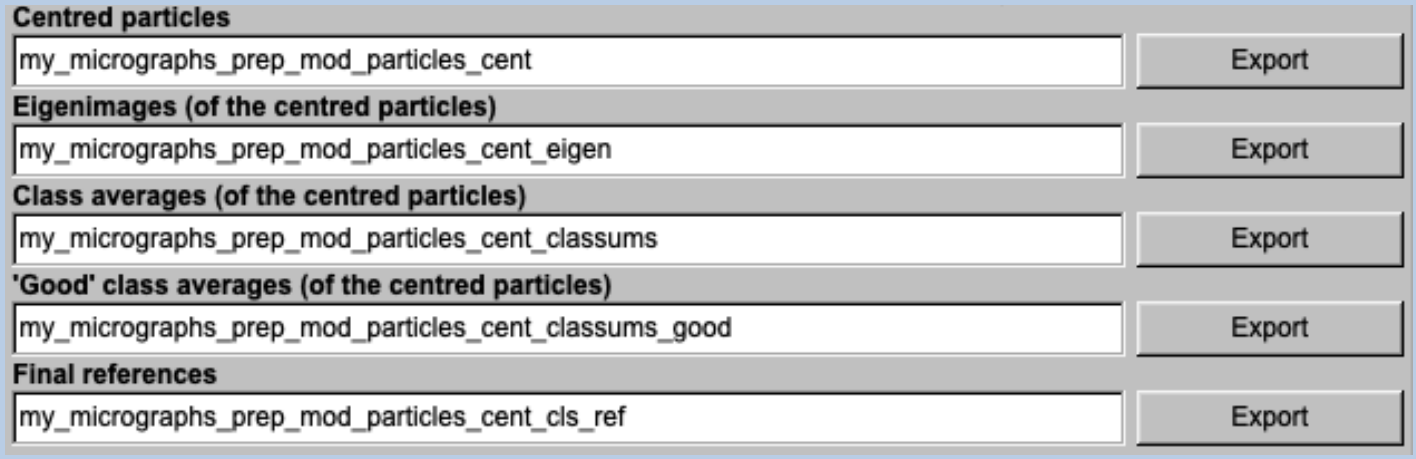
Find references for correlation picking using MSA class averages of the modulation picked particle images.

As usual you have to specify the input file. This file is expected to contain the (final best) modulation picked particles:



Use the browse button or enter the name into the text field.

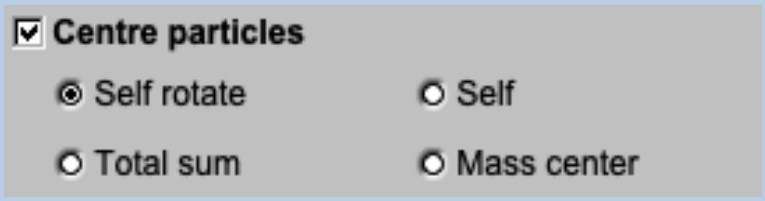
You are also requested to specify the names of the output files. Note that depending on the options chosen the number of output files can change:



Enter the names into the text fields.

As usual you also find the “Export” buttons to export the resulting images to any 3DEM image format.

Modulation picked particles are usually not well centred. So, centring is the first processing suggested:



Options are:

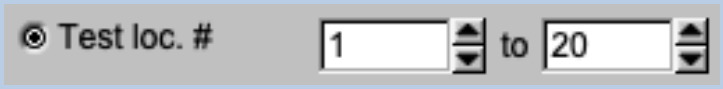
Self rotate: Each image is rotated over 180 degrees and translationally aligned to this 180 degrees rotated version. The centring is over half the shift required for the full alignment.

Self: Each image is iteratively centred relative to rotationally symmetrized version of itself so as to obtain a good centring of relatively globular particles.

Total sum: The input image is iteratively centred relative to a rotationally symmetrized version of the total sum created from of all input images.

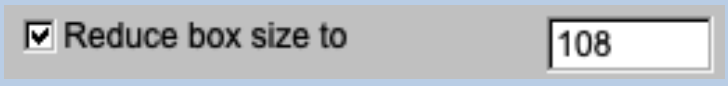
Mass centre: Straightforward shifting the centre of mass of the input image to the logical centre of the output image (half+1 in both vertical and horizontal directions).

Play around with the options using a some images only to find out the best centring.

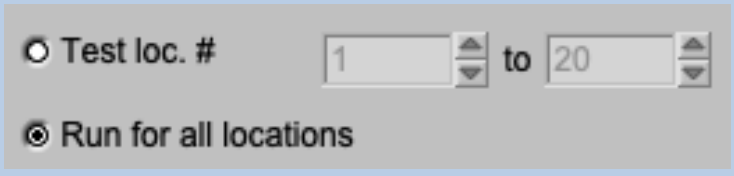


Usually the suggested is option is self.

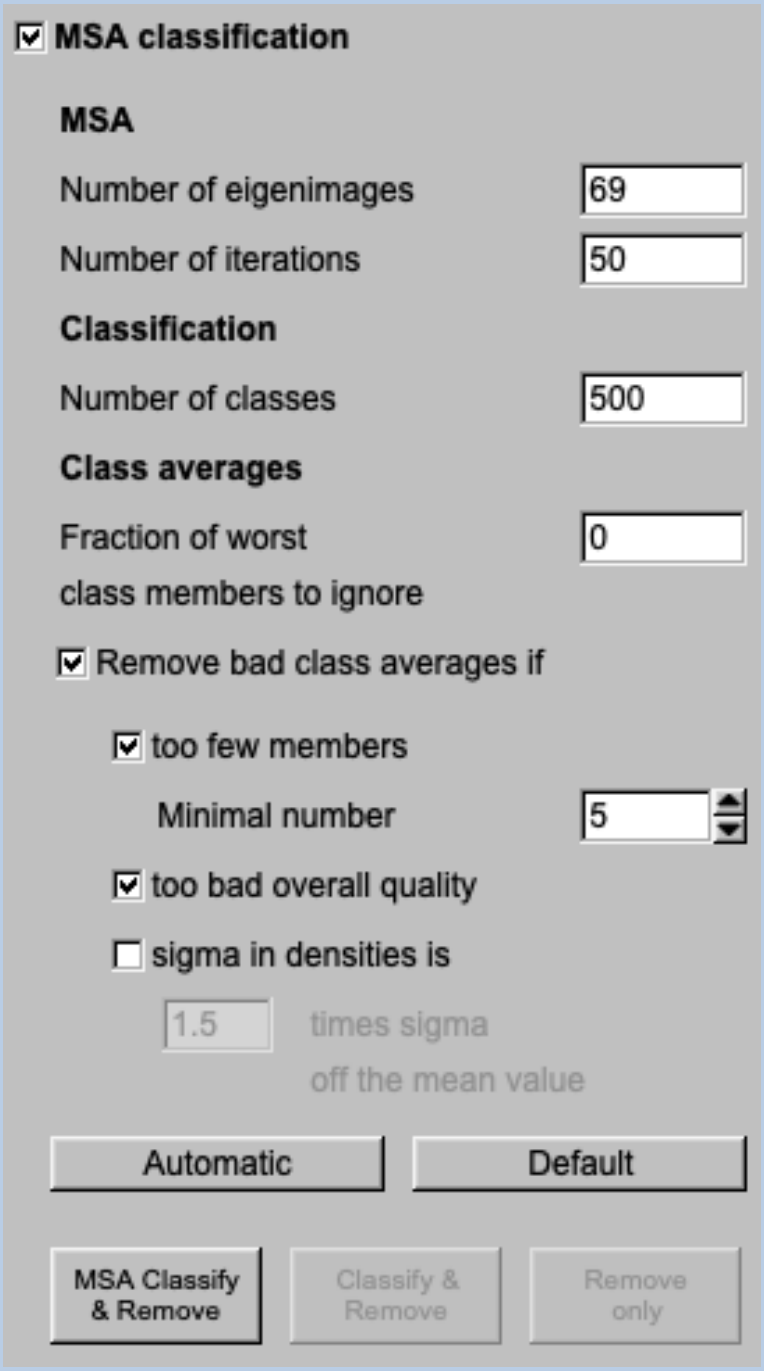
The centred particles need less image sizes so you can reduce the box size:



Having found the best option and box parameter you can centre all images:



Usually the centred particle images are still not good references but can be used for MSA and classification to get (better) class averages:

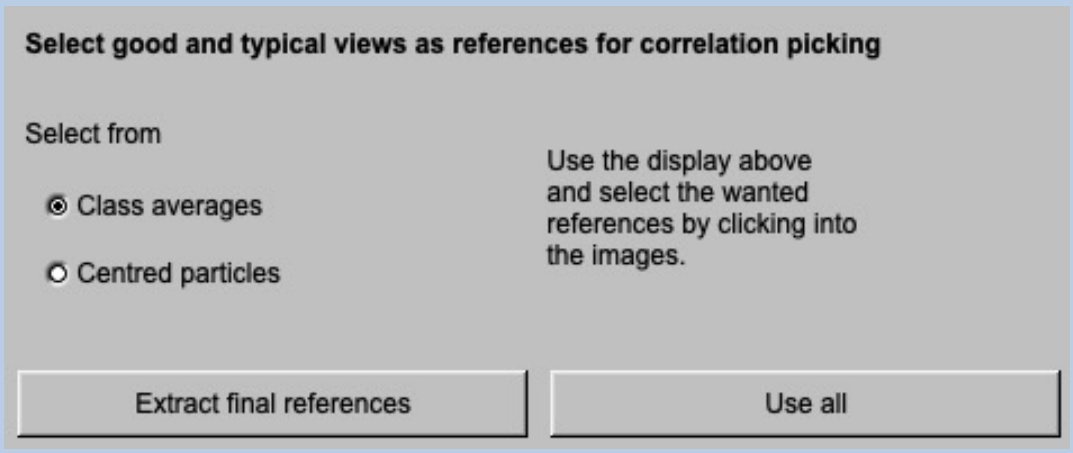


After the first MSA and Classification you can re-run “Classify” to change the number of classes without re-calculating the more time-consuming MSA:

You can also re-run “Remove” with other options and parameters without re-calculating the more time-consuming MSA and classification :

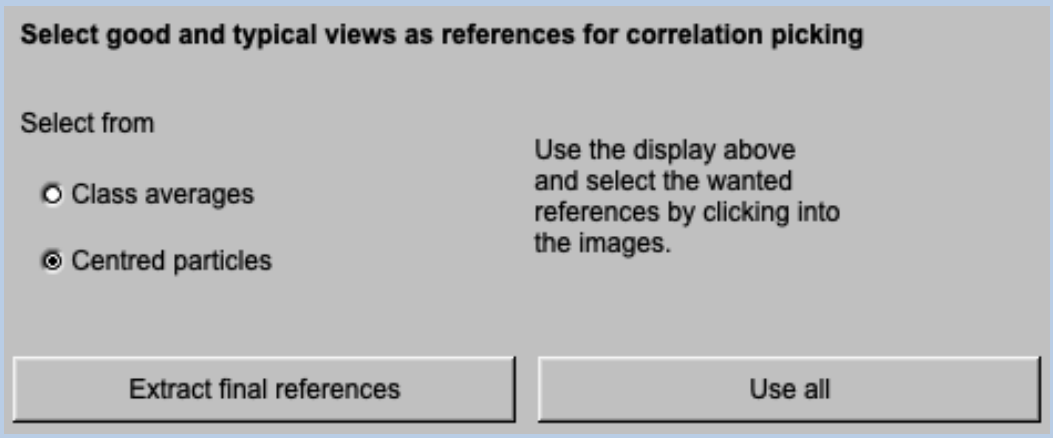
Refer to **guiMSA** to get additional help on MSA and classification.

Check the displayed class averages and select good and typical particle views by clicking into the related image (a second click will de-select the image). Finally extract the selected references clicking the “Extract final references” button:



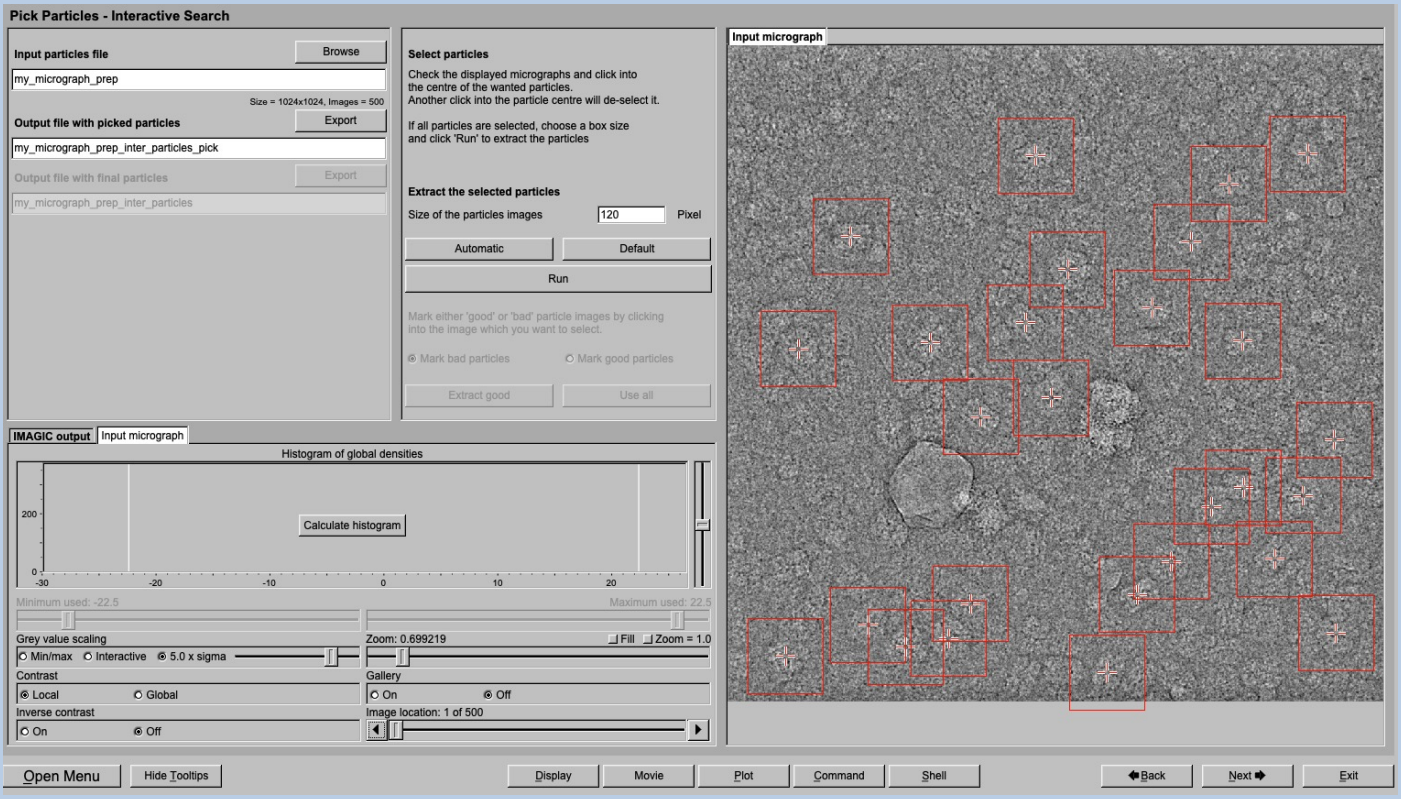
You can also use “Use all” button to use all class averages as references. This is usually never suggested but it is you choice, of course

If the class averages do not show good and typical particle views you can alternatively select from the centred particle images. Like “Use all” this option is usually never suggested.



The ”Next” button leads to the “Prepare Correlation References” Page”.

The “Pick Particle - Interactive Search” Page

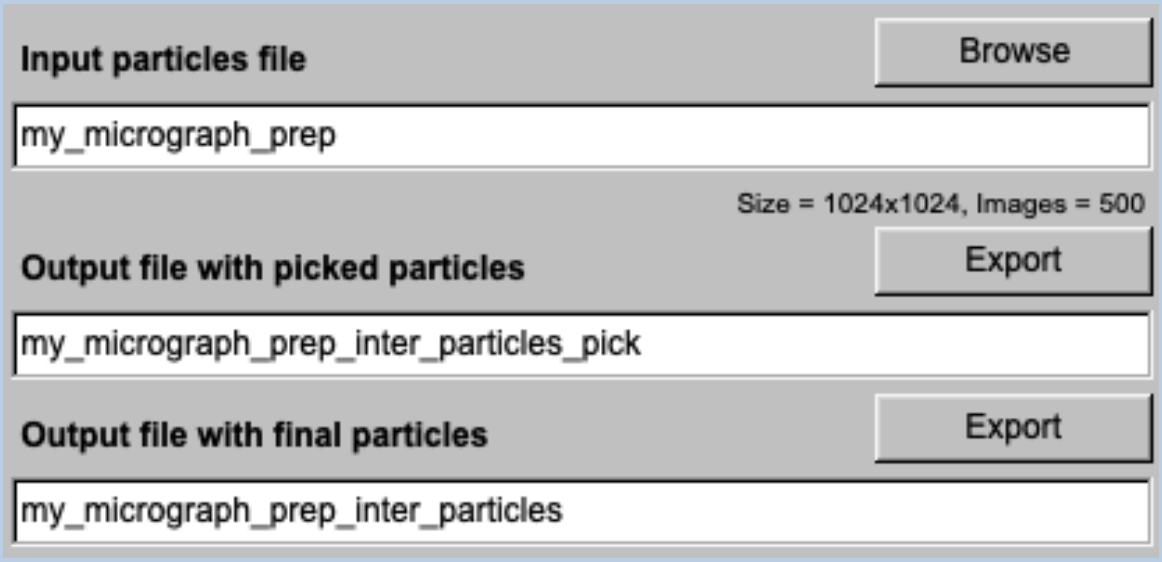


DESCRIPTION:

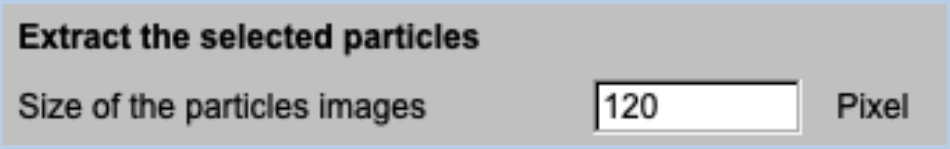
Find particles by interactive picking. Extract selected particle images.

You may want to pick you particles interactively or interactively select reference particles for correlation picking. Both is not suggested but it is your choice, of course.

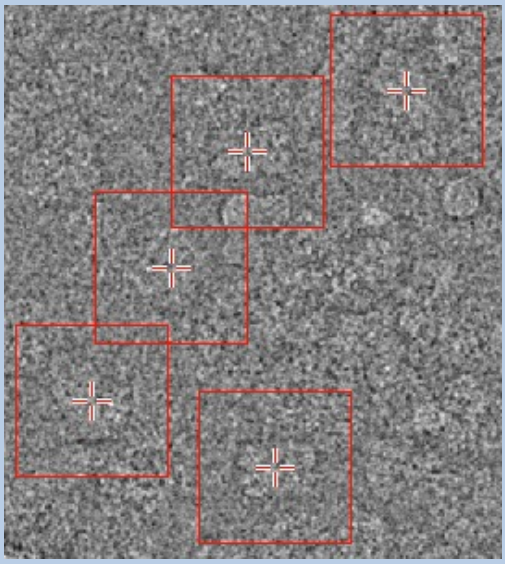
As usual specify the names of the input and output files:



Specify the image size of the cut-out particle images. This box size is shown in red when you are picking particles so that you can check if the output image size is large enough.

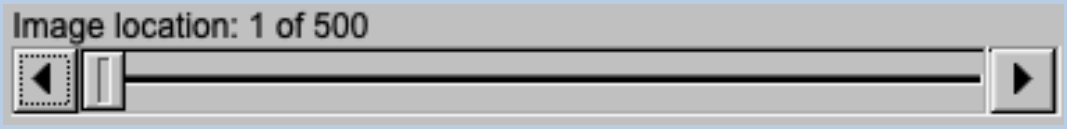


Now you can start picking particles by clicking into the centre of the wanted objects:

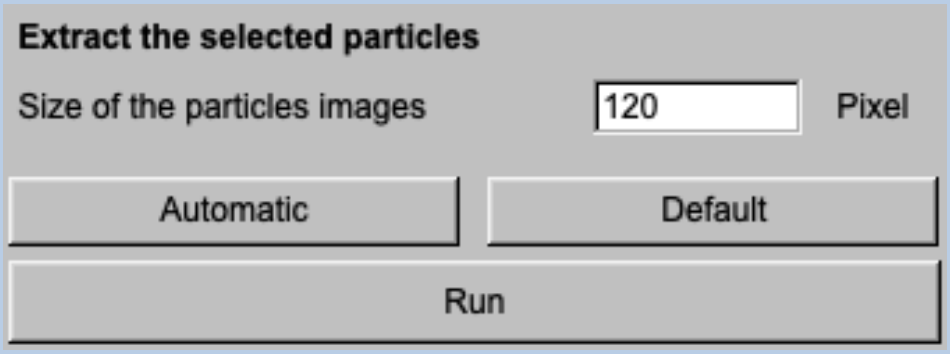


Clicking a particle a second time will remove it from the list.

Click particles for all micrographs wanted. Use the “Input micrograph” display control on the left hand side to navigate from micrographs to micrograph (image locations)



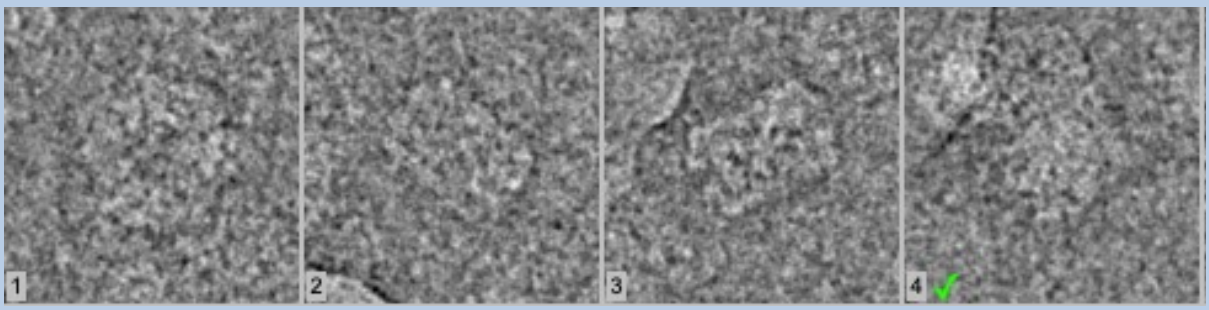
Having finished picking you can click the “Run” button to extract the selected particles. If wanted you can adjust the box size (= size of the output images)



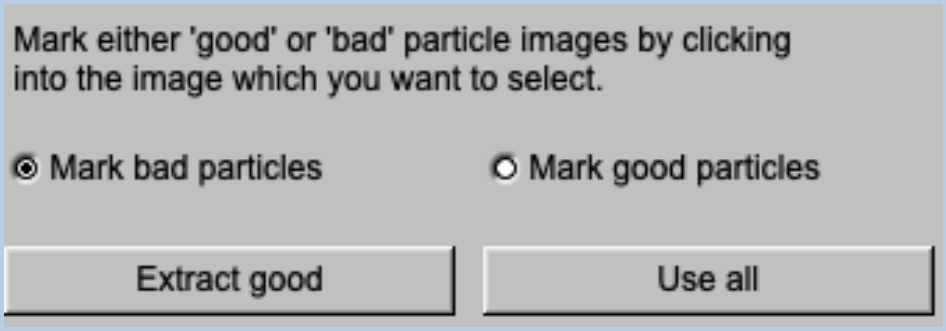
The extracted particle images are shown on the right hand side. Remember that you can use “Zoom” in the display control on the left hand side to enhance or reduce the number of images shown in this gallery.

If all extracted particle images are okay press the “Use all” button to get the “final particles”.

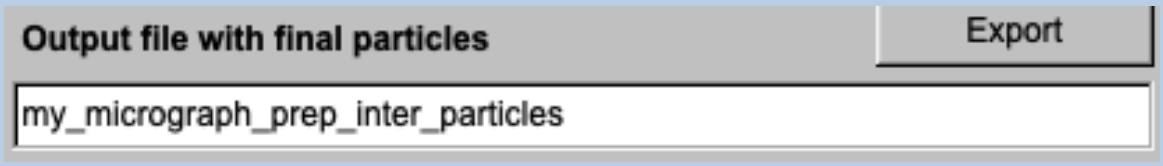
If wanted you can check the list and either mark the “good” or the “bad” particle images by clicking into the related image on the display on the right hand side.



Specify if you marked the “bad” or the “good” images and click the “Extract good” button to either select the “good” particles or remove the “bad” particles to get the “final particles”.

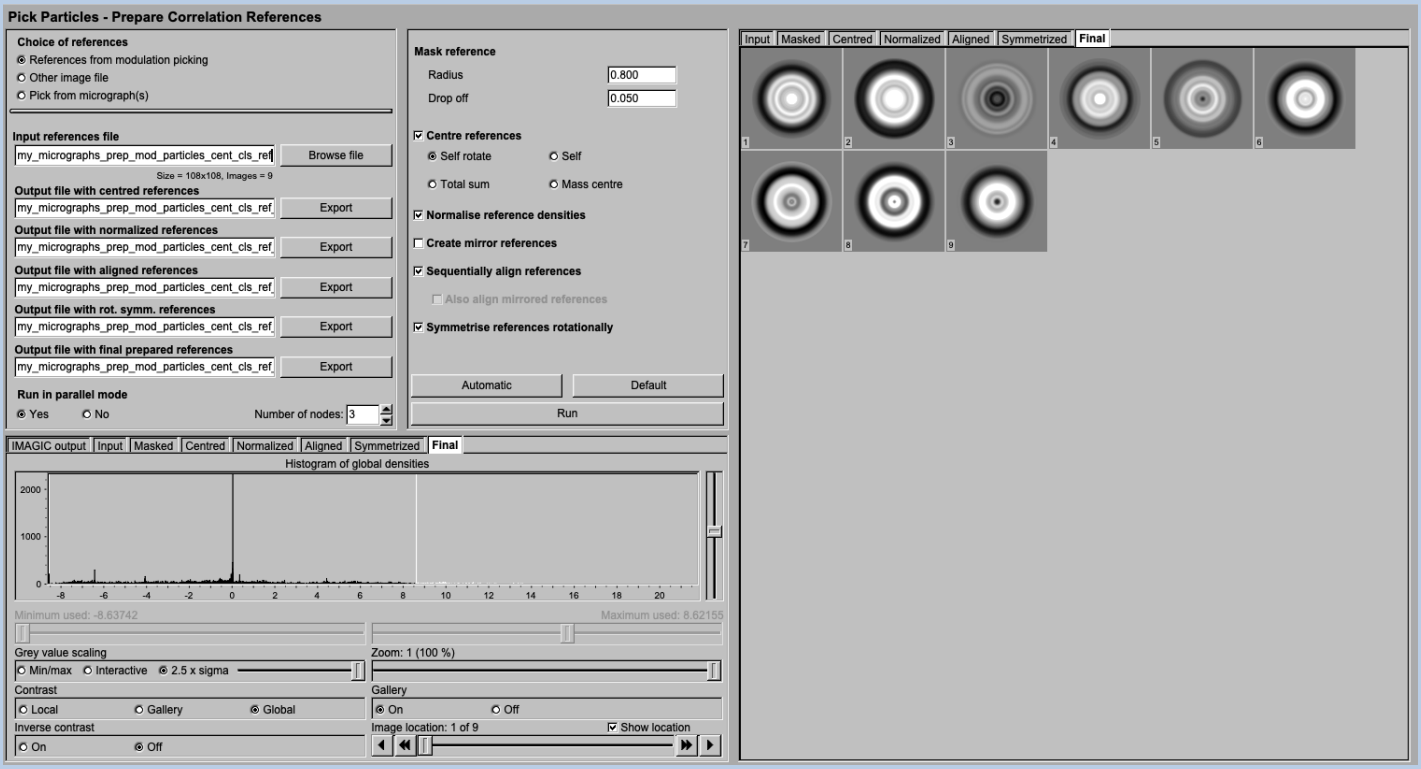


Note that you can use the “Export” button to open an additional EM2EM window to export the chosen output file to a file in any 3DEM format:



The ”Next” button leads to the “Prepare Correlation References” Page”.

The “Pick Particle - Prepare Correlation References” Page

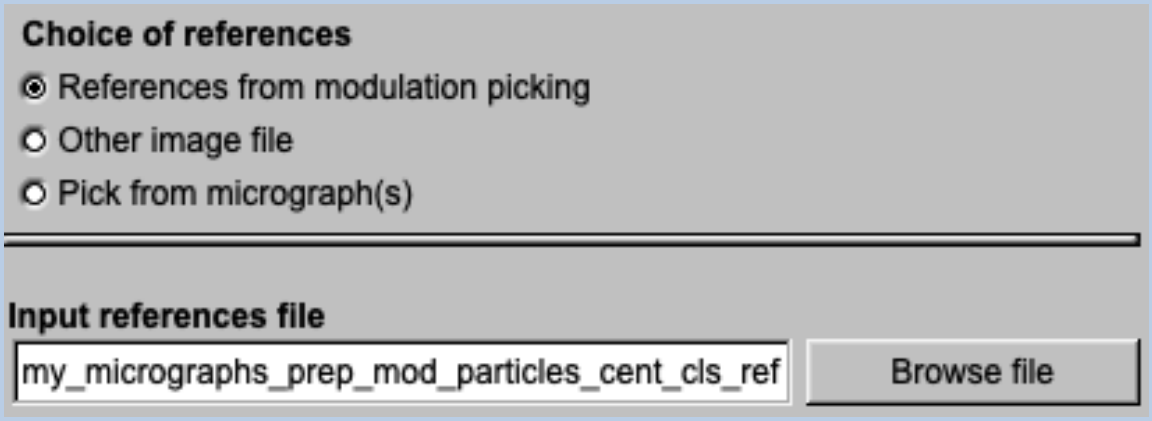


DESCRIPTION:

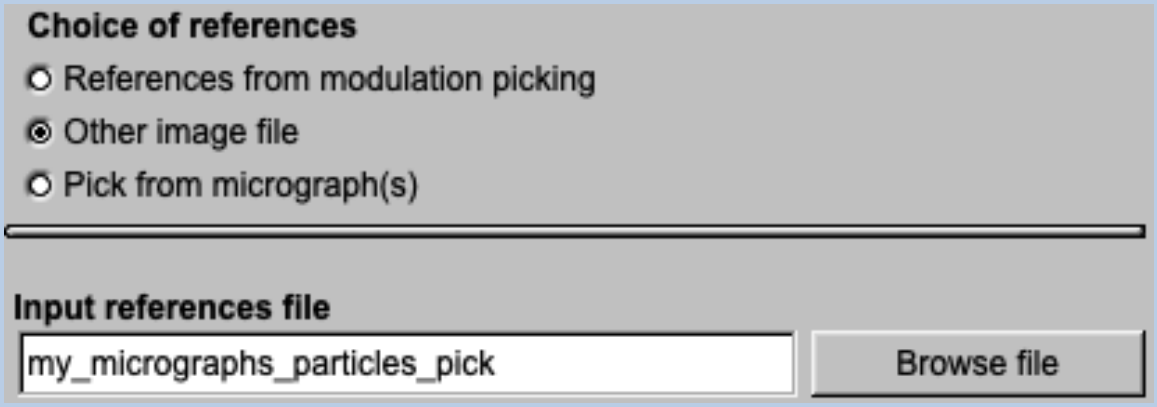
Prepare the selected / picked images to be used as references in the subsequent correlation search.

Before correlation particles search one usually has to prepare the references.

As usual first specify the input file which contains the images which are to be prepared as references in the subsequent correlation search. These images be the best images from modulation picking



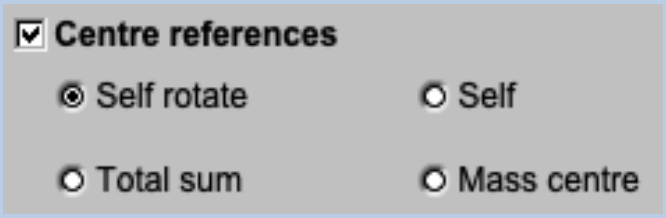
or any other images you have selected / picked:



At the edges of the images there are features which are not related to the particles. This information is “removed” by applying a circular mask:

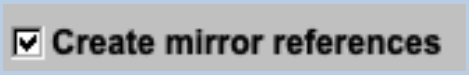
The reference particles have to be well centred. Play around with the various options to get good results.

The reference particles have to be well centred. Play around with the various options to get good results:

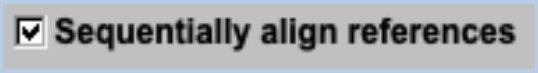


It is also suggested to normalise the variance in the reference images:

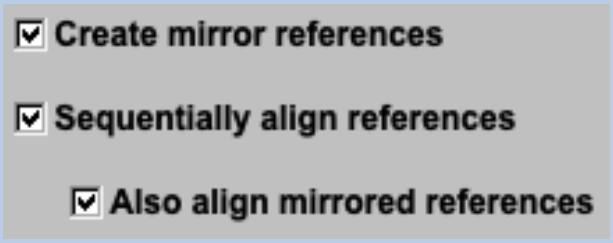
You can also create mirror versions of the reference images.



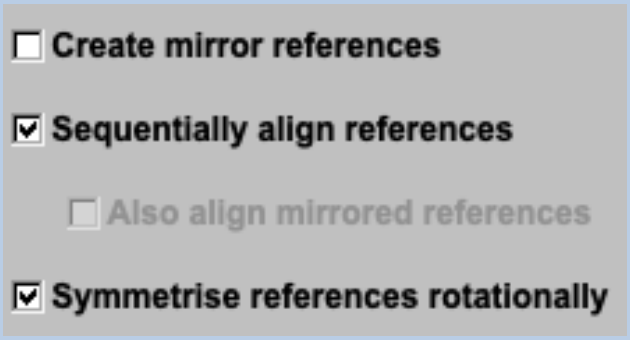
The number of references is small, it can be good idea to sequentially align them:



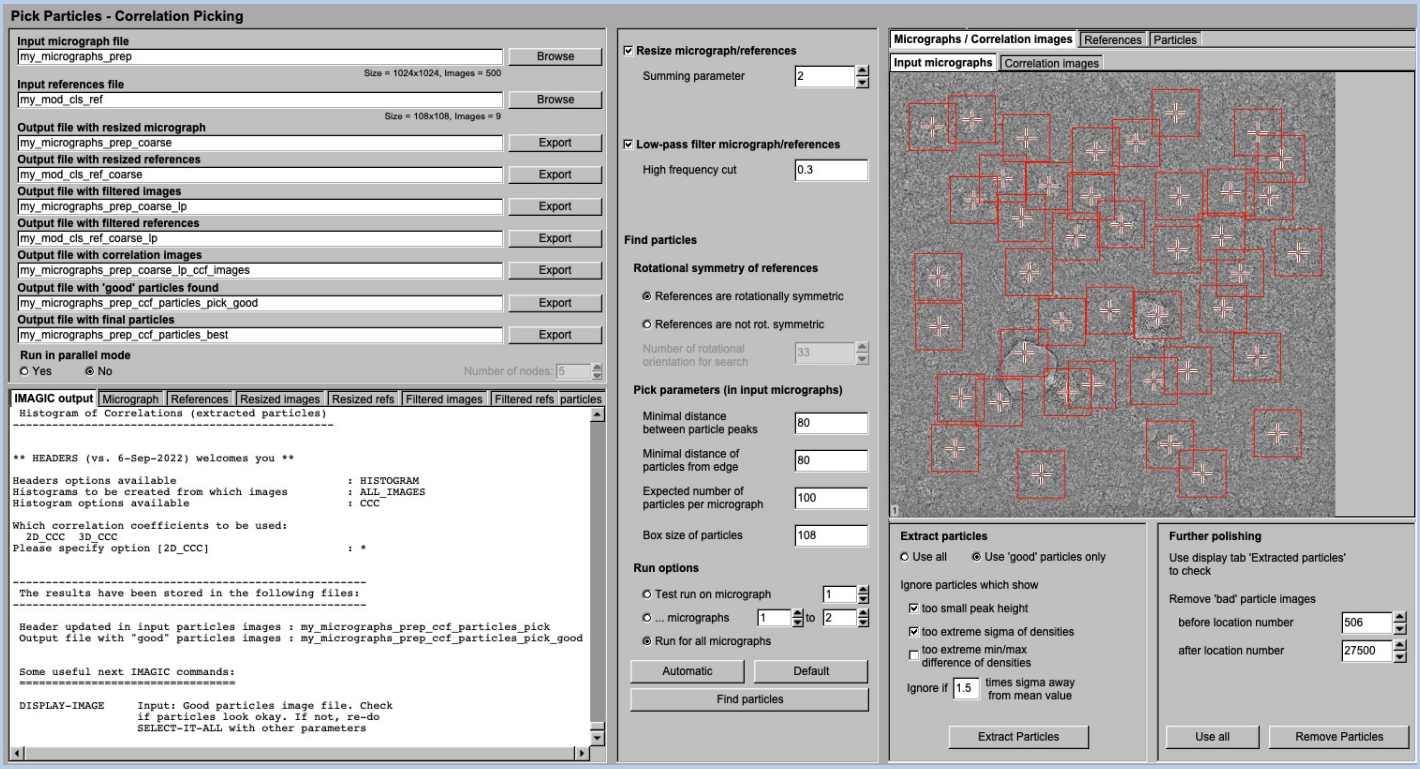
If mirror versions are requested to have to choice to align or to align them:



When doing the correlation search for the first time you will usually not create mirror versions but rotationally average the references especially in the case particles show all possible rotational orientations on the micrograph (note that in this case mirrors do not make sense):



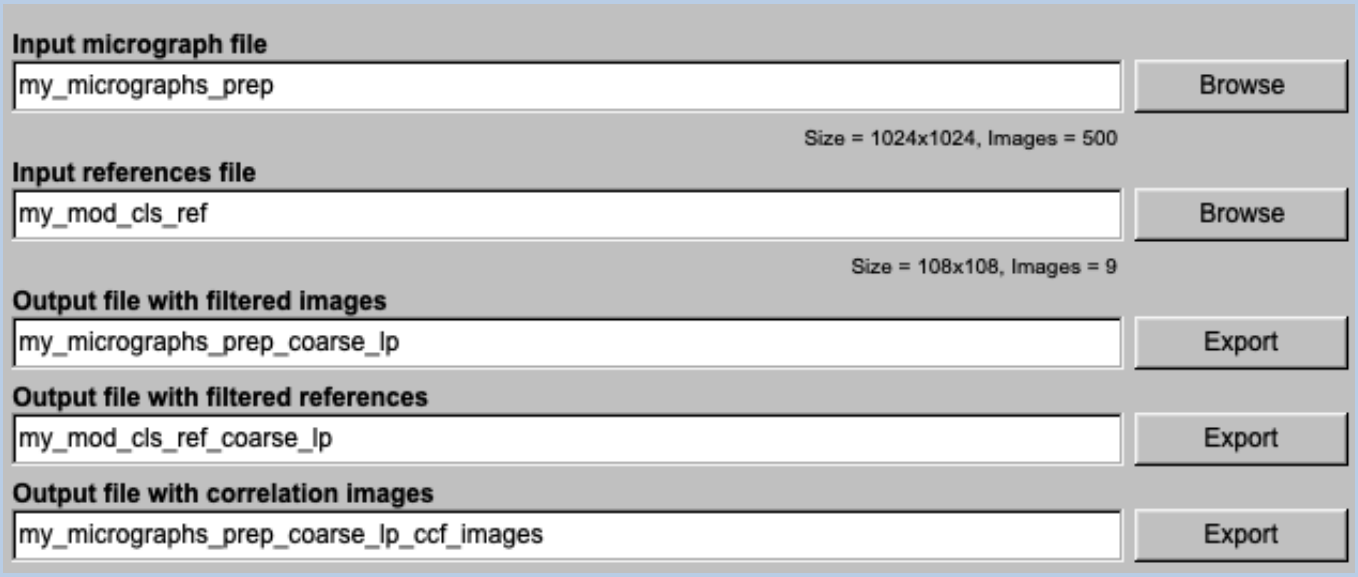
The “Pick Particle - Correlation Picking” Page



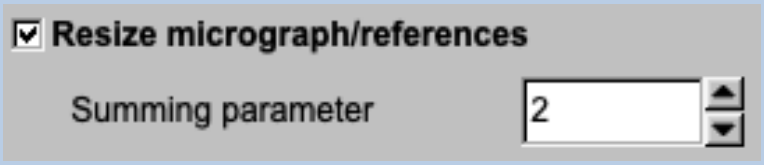
DESCRIPTION:

Find particles using correlation search and extract/cut-out particle images.

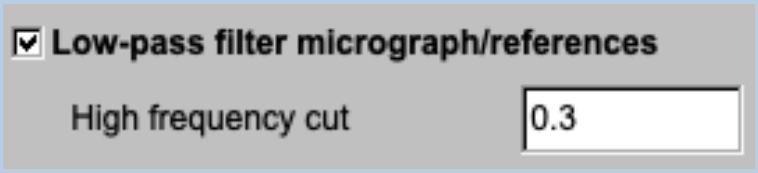
Specify the name of the (prepared) input micrograph file and the name of the file with the prepared references. As usual, output file names are suggested but you can always change names :



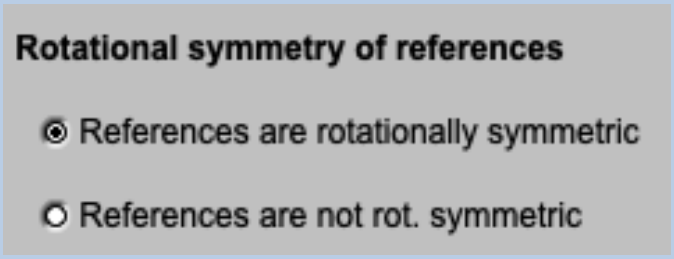
To speed up the calculations the micrographs can be resized (only used during the correlation search:



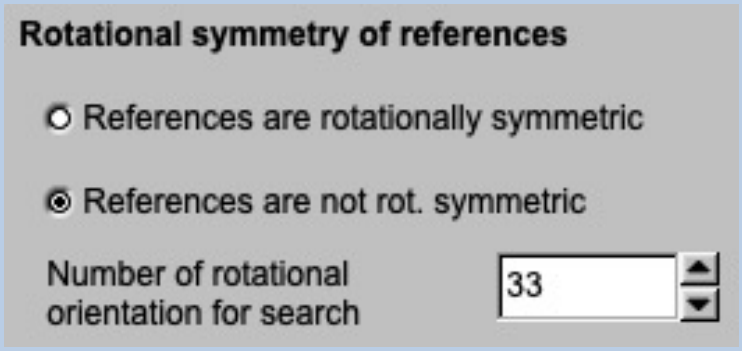
It is very important to strongly low-pass filter the references to avoid overfitting (correlation of noise):



If your input references are rotationally averaged, click the related button:

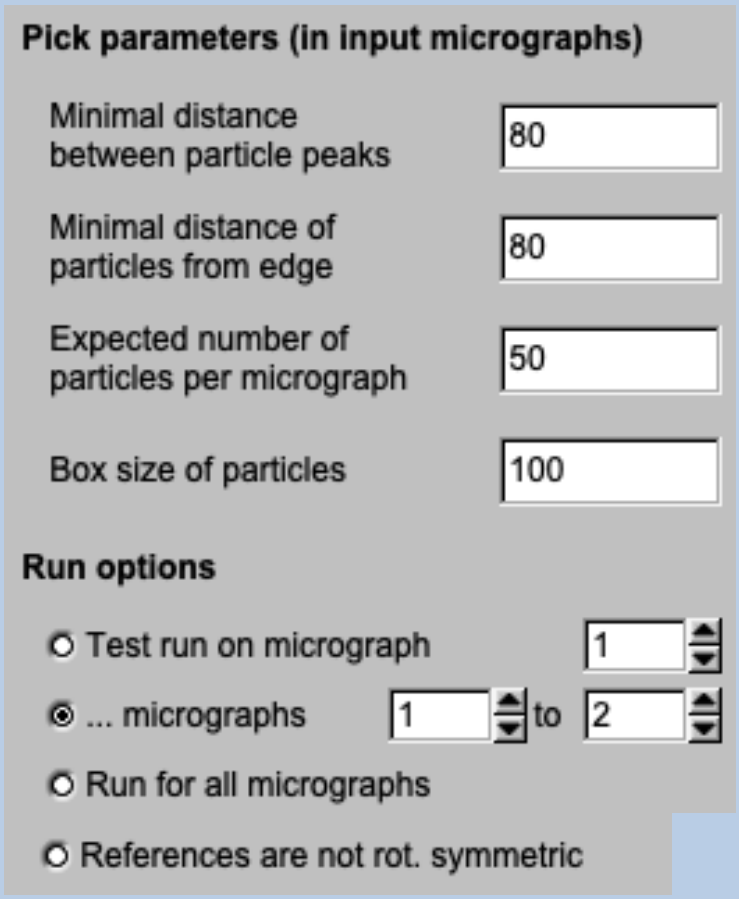


If the references are not rotationally averaged rotated versions of the references will be created during particle search:



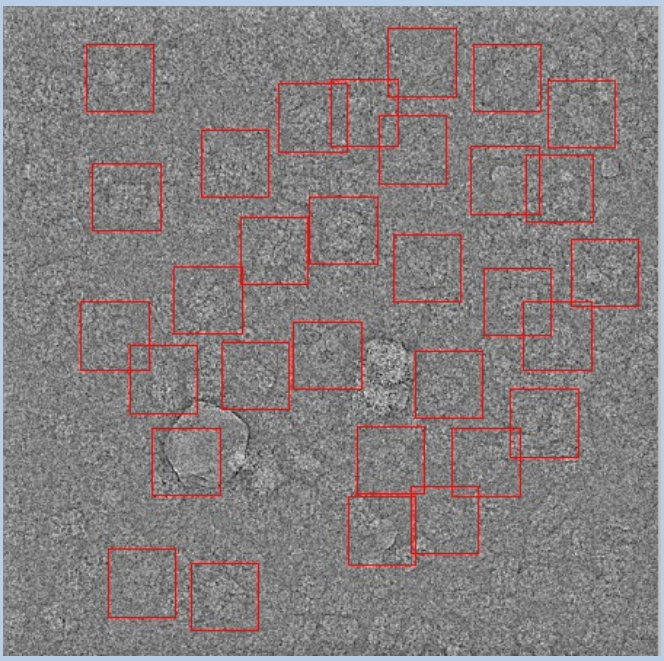
When re-searching particles at a later stage of a “real science analysis” with better references you would go for this option. This option is very time-consuming.

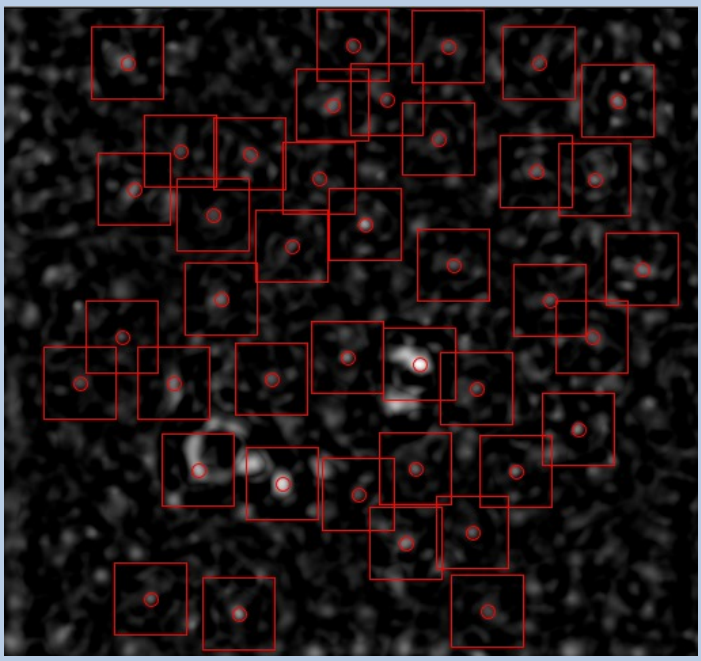
Play around with the pick parameters, Run the search for only a limited number of micrographs to test how the given parameters influence the search:



NOTE: The particles are not yet extracted

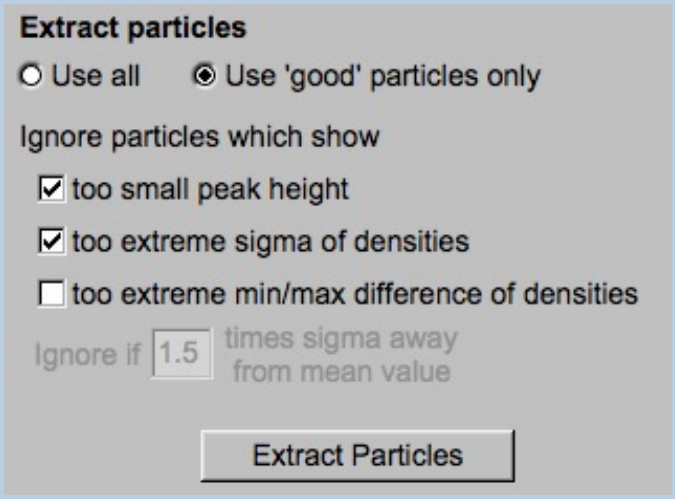
Check the particles found in the displayed micrographs and the peaks in the displayed correlation images:





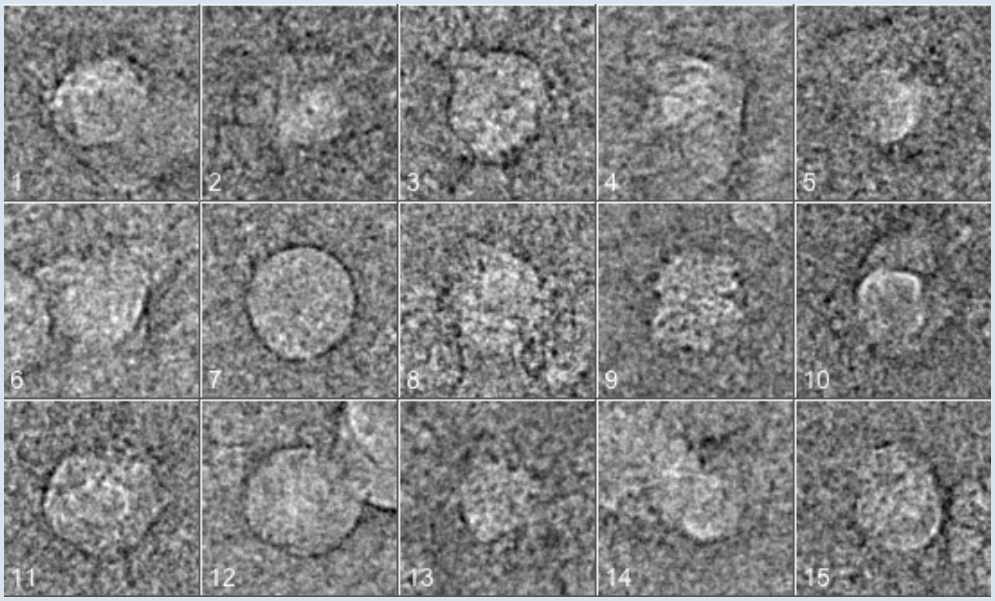
Check Finally, search particles in all micrographs.

Now the particles can be extracted. Like in Modulation Picking, the images contain a lot of picked junk (ice, carbon foil, clumped particles). In a first approach, they can be sorted out by looking at the statistics of the picked particles using the button “Extract ‘good’ particles only”:

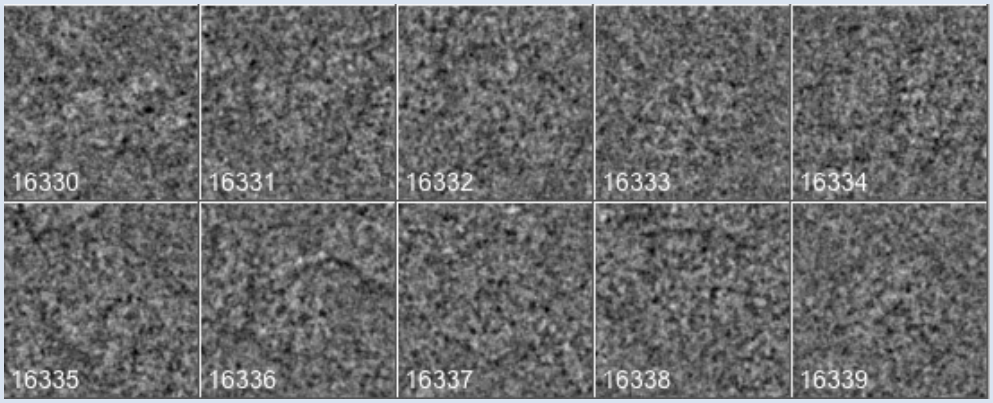


Check the extracted particles displayed on the right-hand side.

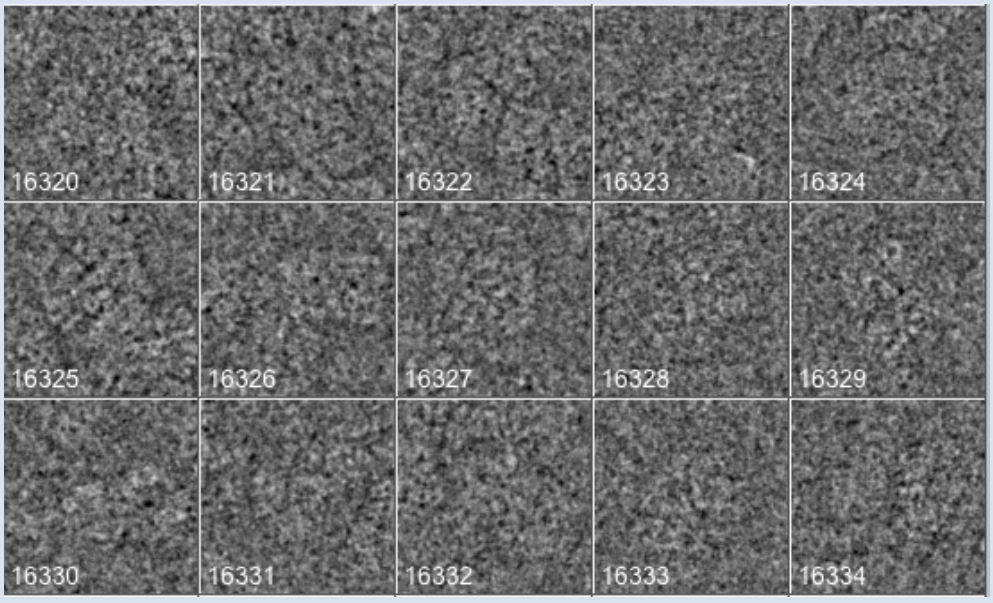
You can see that the first displayed images contain ice blobs etc.



whereas the last images usually contain noise:



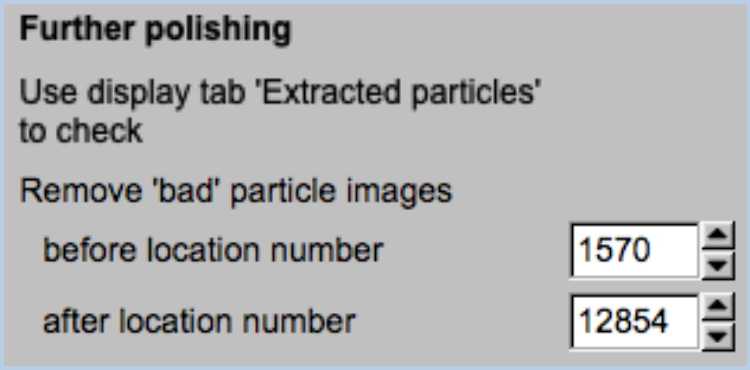
The particle images are in between:

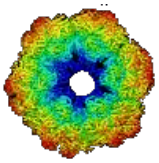


Check the extracted particles and write down the location numbers where the good particle images start and where they end. Also have a look at the histogram printed in the terminal window to get an idea where to find this range of good particle images:

```
Histogram of CCCs from gisp_ccf_particles_pick_good

16341     0     0   1.15E+00 |
15627   714   714   1.27E+00 |********************
14703  1638   924   1.34E+00 |************************
13563  2778  1140   1.40E+00 |*******************************
12337  4004  1226   1.46E+00 |*********************************
11085  5256  1252   1.52E+00 |*********************************
 9696  6645  1389   1.58E+00 |*************************************
 8322  8019  1374   1.64E+00 |*************************************
 7109  9232  1213   1.71E+00 |*********************************
 5999 10342  1110   1.77E+00 |******************************
 4991 11350  1008   1.83E+00 |***************************
 4138 12203   853   1.89E+00 |************************
 3415 12926   723   1.95E+00 |********************
 2832 13509   583   2.01E+00 |****************
 2336 14005   496   2.07E+00 |**************
 1954 14387   382   2.14E+00 |***********
 1604 14737   350   2.20E+00 |**********
 1348 14993   256   2.26E+00 |*******
 1126 15215   222   2.32E+00 |******
  934 15407   192   2.38E+00 |*****
  804 15537   130   2.44E+00 |****
  701 15640   103   2.51E+00 |***
  590 15751   111   2.57E+00 |***
  509 15832    81   2.63E+00 |**
  428 15913    81   2.69E+00 |**
  380 15961    48   2.75E+00 |*
  335 16006    45   2.81E+00 |*
  295 16046    40   2.87E+00 |*
  265 16076    30   2.94E+00 |*
  241 16100    24   3.00E+00 |*
  214 16127    27   3.06E+00 |*
  188 16153    26   3.12E+00 |*
  162 16179    26   3.18E+00 |*
  149 16192    13   3.24E+00 |
  130 16211    19   3.31E+00 |*
    0 16341   130   3.43E+00 |****

Low values binned at  lower edge : 0
High values binned at higher edge: 118

Meaning of columns: # remaining, # accumulated, # in this bin, bin value
```

Finally extract the best particles using the “Remove Particles” button:





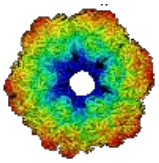
IMAGIC

guiPICK

Not (yet) possible

The following options are not (yet) possible:

- Run in batch mode.
- Store output files and results of different pages in different sub-directories of the working directory.



IMAGIC

guiPICK

Feedback / Error hints

We intensively tested the **guiPICK** program and tried to find all possible errors and inconsistencies. But the current program is very complex and still in progress. So you may still find some problems.

We are happy to get feed-back. Please send your comments, error hints etc. to

imagic@ImageScience.de

THANK YOU VERY MUCH.

Image Science

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