

### **A Brief Introduction**

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# The IMAGIC guiDISPLAY program

© Image Science Software GmbH (Version 2023-01-25 11:26:30 +0100)	guiDISPLAY	Mon 30 Jan 2023 14:59:40
Display		
Input file       my_images       Size = 160x160, Images = 143	Import Browse	
Histogram of global densities	т 22 2 2 2 2 2 2 2 2 2 2 2 2	
Contrast     Gallery       © Local     ○ Gallery     ○ Global     © On     ○ Off       Inverse contrast     Overlay     ○ </th <th>3D volume iess loop 1 9 (s)************************************</th> <th>13     14     10       1     1     10     10       3     10     10     10       4     10     10     10       5     10     10     10       6     10     10     10       7     10     10     10       8     10     10     10       9     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10</th>	3D volume iess loop 1 9 (s)************************************	13     14     10       1     1     10     10       3     10     10     10       4     10     10     10       5     10     10     10       6     10     10     10       7     10     10     10       8     10     10     10       9     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10       10     10     10     10
Hide <u>I</u> ooltips Exit <u>E</u>	Display Movie Plot Color Mapping	Shell Dext Dext Dext Dext

The **guiDISPLAY** program visualises image / 3-D volume stored in an IMAGIC or any 3DEM formatted image file.

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

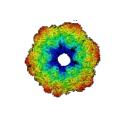
#### CONTENT:

- IMAGIC GUI programs
- guiDISPLAY
  - > The Display Page
  - > How to create a profile
  - > How to select images
  - > How to pick particles
- Error hints

How to use IMAGIC GUI programs How to display images/3D volumes

How to send us feedback





## IMAGIC

# **GUI Programs**



IMAGIC guiDISPLAY - Hands-On

### The Working Directory

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

IMAGIC-COMMAND : guiDISPLAY

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

If you want to change this directory use the "Exit Display" button

Exit Display

to navigate to the "Start" page where you can specify the working directory of **guiDISPLAY**.

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.

Click the "Display" button to return to the "Display" page.

<u>D</u>isplay



## 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 file	
Please specify the name of the input file which is expected to images or 3D volumes to be displayed.	contain the
Display controls Image profile	
Browse	
Browse for the input file which is expected to contain the in volumes to be displayed.	ages or 3D

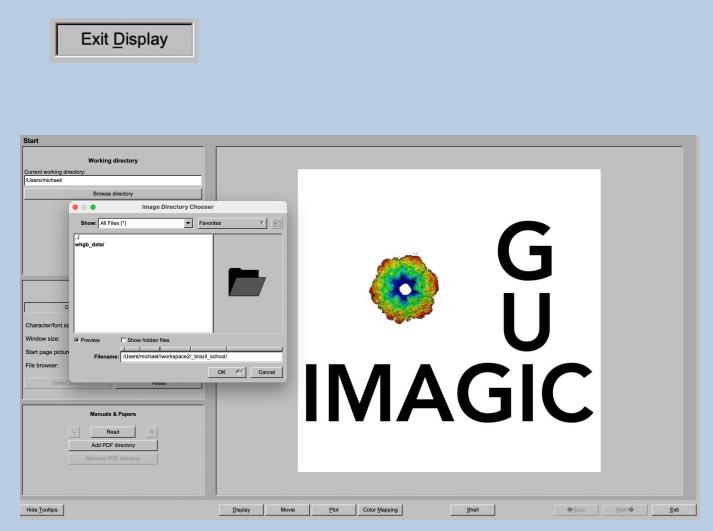
Zoom: 1 (100 %	<u>لا</u>	Constant of the
Gallery © On	'Display controls' shows a number of control by the input file display. To get detailed help move field where you can adjust the related value/op	e the cursor into the control



### The "Start" Page

guiDISPLAY starts with the "Display" page.

If you would like to adjust some **guiDISPLAY p**rograms setting before importing the images use the "Exit Display" button to navigate to the "Start" page.





On the "Start" page you can set some program parameters:

a) the working directory

Start
Working directory
Current working directory:
/Users/michael/workspace2/_brazil_school/
Browse directory

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

Click to close the program settings menu					
Character/font size:	12				
Window size:	1540 x 900				
Start page picture / movie:	Image $\nabla$				
File browser:	Standard V				
Save/Cancel	Reset				

Having adjusted all setting use the "Display" button to navigate back to the "Display" page.

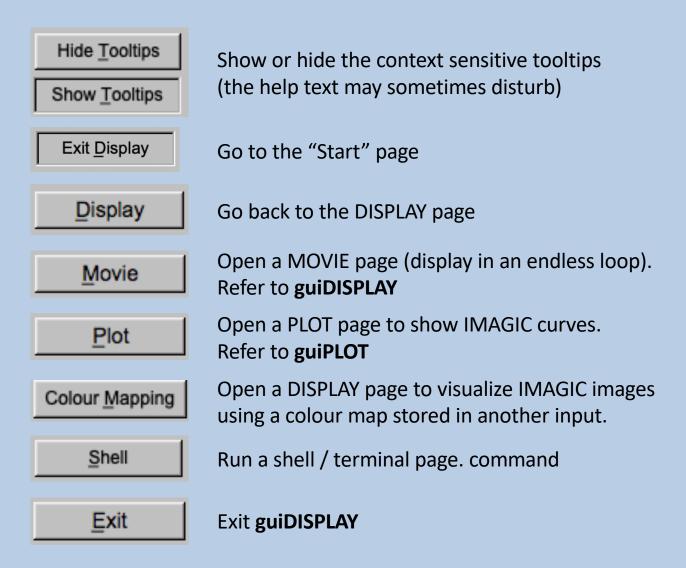




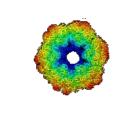
### The Toolbar

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

The toolbar buttons:







### IMAGIC

# guiDISPLAY



IMAGIC guiDISPLAY - Hands-On

# The "Display" page

Display	
	Input images
Input file	
my_images Import Browse	
Size = 160x160, Images = 143	
Histogram of global densities	
	1 2 3 4 5
4000	
3000	
2000 -	
1000 -	8 7 8 9 10
-60 -50 -40 -30 -20 -10 0 10 20 30 40 50	
Minimum used: -50.2426 Maximum used: 50.2663	
Grey value scaling Zoom: 0.88088 (94 %)	
O Min/max O Interactive @ 5.0 x sigma	
Contrast Gallery	17 12 13 14 15
Collery O Global O On O Off	
Inverse contrast Overlay 3D volume	
0 0n € 0ff 4 1 ▶ 4 1 ▶	
Image location: 1 of 143 Show location	
Choose from options available	16 17 18 19 20
	We have a second s
Open select option Open profile option	
Little Taplica	Plot Color Mapping Shell & Back Next D Exit
Hide Tooltips Exit Display Movie	Plot     Color Mapping     Shell     Mext III     Exit

On the left-hand side you can specify the input file and adjust the display parameters. The images are displayed in the window on the right-hand side.

First specify the name of the file with the images to be displayed. Either enter the name of the file into the text field

#### Input file

/Users/michael/workspace2/\_brazil\_school/my\_images

or use the "Browse" button to browse for an IMAGIC image file.

Browse



#### Clicking the "Browse" button will open the IMAGIC file chooser:

Show: Project file	s (whgb*.{hed,img})_	Favorites	▼ €	Choose the wanted file by clicking its name
whgb_3d_3.hed whgb_3d_3.img whgb_3d_masked_ whgb_3d_masked_ whgb_3d_masked_ whgb_3d_masked_ whgb_3d_masked_	2.img 3.hed			You can use a pre-selection of the files shown:
Filename: //In	nagic/imagic/test/_tes	It_gui/whgb_3d_2.im OK =</td <td>g Cancel</td> <td>Show: Project files (whgb*.{hed,img}) IMAGIC files (*.{hed,img}) All Files (*) whgb_3 whgb_3 </td>	g Cancel	Show: Project files (whgb*.{hed,img}) IMAGIC files (*.{hed,img}) All Files (*) whgb_3 whgb_3 
. 1	2	\$ 3		If the images are in IMAGIC format you can get a pre- view
4	¢ 5	<b>0</b>		of the images.
Location 4 1	▶ III 0 Contra	isty 0	Zoom	Note that you can store your directory in "Favorites".

If the input file is in an IMAGIC but a 3DEM file use the "Import" button to create an IMAGIC image file. Note that a separate "EM2EM" window will open to calculate this conversion.



Refer to the "guiEM2EM manual" for further help.



# **Display Control**

The visualisation settings of the images shown on the right-hand side can be adjusted on the left-hand side

		Histogram of g	lobal densities			
5000 -						
4000 -						
3000 -						
2000 -						
		1				戸
1000 -		1 <b>-</b>				
0 <u></u>	· · · · · · · · · · · · · · · · · · ·					
-60	-50 -40	-30 -20 -10	0 10	20 3	30 40	50
Minimum used	: -50.2426				Maximum u	ised: 50.2663
			-			
Grey value sca		-	Zoom: 1 (100 %	)		
O Min/max	O Interactive	k sigma ─────	-			<u> </u>
Contrast			Gallery			
Local	O Gallery	O Global	l ⊙ On	O Off		
Inverse contra	st		Overlay		3D volu	ime
O On	Off		▲ 1		4	1
Image location	: 5 of 143	Show location				
▲ ◀ - []-			Use slider	O Endless	loop	15 fps⊽

To get a feeling about the image densities you will usually click the "Calculate histogram" button

Calculate histogram

to calculate a histogram of the global (all images) density distribution.

If the curve does not fit the window you can use the slider on the lefthand side of the histogram display to adjust the vertical scaling.



The various display option are described in the following:

#### CONTROLS TO ADJUST THE CONTRAST

Grey value s	caling		
O Min/max	O Interactive	● 5.0 x sigma	<u>[</u> ]_
Contrast			
Local	O Galle	ry OG	lobal
Inverse contr	rast		
O On	Off		

#### GREY VALUE SCALING

Grey value scaling				
O Min/max	O Interactive	● 5.0 x sigma		-[]-

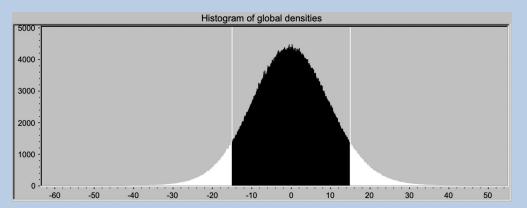
#### Options are:

Minmax: Scale the grey-values to the minimum/maximum

N times sigma: Use an amount of sigma to set the scaling limits Use the slider to change the value of N

● 1.5 x sigma -

Have a look at the histogram to check the limits



Interactive:

#### Set the limits by giving numbers

Graphics minin	Graphics minimum Graphics maxim			aphics maximum	
-63.5993	Reset			Reset	55.317



#### HOW TO CALCULATE THE GREY VALUE SCALING:

Contrast			
O Local	O Gallery	Global	

#### Options are:

- Local: Scale the grey-values in each image separately
- Gallery: Scale the grey-values using the currently displayed images
- Global: Scale the grey-values using all image densities in the input file (relates to the "Global histogram")

#### **INVERSE CONTRAST:**

Inverse contra			
O On	Off		

**Options are:** 

- On: Inverse the contrast, Black will be white and vice versa,
- Off: No changes

#### ZOOM:

Enlarge or reduce the displayed images. Use the slider to change the zoom factor.

Zoom: 0.62107 (79 %)	

Note that in "Gallery: On" the maximal zoom factor is 1. Larger zoom factors are only possible in mode "Gallery: off"

Zoom: 11.5	5		
-			
Gallery		🔟 Fill	Zoom = 1.0
O On	Off		



Note: In mode "Gallery off) you can click the "Zoom = 1.0" button to visualise the image 1:1 or you can click the "Fill" button to enlarge the images to fit the display window.

#### GALLERY - NUMBER OF IMAGES DISPLAYED:

Gallery		I Fill ☐ Zoom = 1.0
O On	Off	

Options are:

- On: Display a gallery of images
- Off: Display only a single image

#### IMAGE LOCATION – WHICH IMAGES ARE TO BE DISPLAYED:

Image location: 1 of 143		
< []		

Use the slider or the arrows to select the (first) image to be displayed in the display window on the right-hand side.

Image location: 42 of 143				
	<u>[]</u>			

DISPLAY OR MOVIE:

Images can be displayed using the slider (usual display)

Use slider O Endless loop	00	15 fps⊽
---------------------------	----	---------

or in an endless loop (movie):

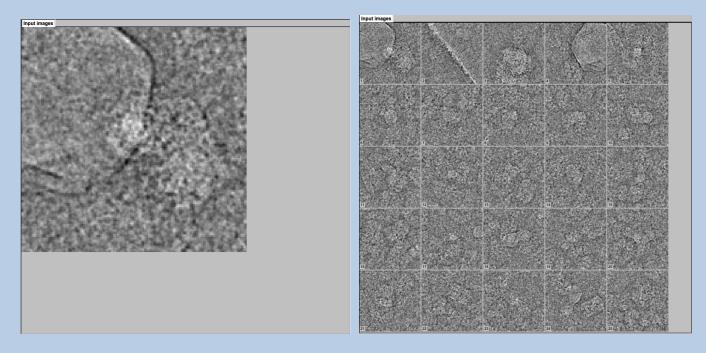
O Use slider	Endless loop		15 fps⊽
--------------	--------------	--	---------

The movie can be stopped by clicking \_\_\_\_\_, the speed of the movie can be adjusted using the button "fps" (frames per second) 15 fpsv.



# **Display Window**

The image(s) are displayed in the window at the right hand side either as a single image or as a gallery of images.



Moving the cursor into the display window there are a few options:

**New window** Open the display window a larger separate display window

Save	
Save all	

Save the current displayed image or gallery in JPG image

Save the whole window in JPG image



# **Display Option "Profile"**

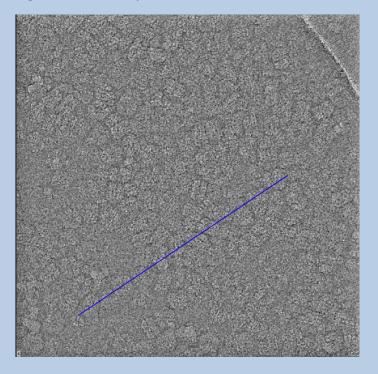
Get the "Profile" mode by clicking the button "Open profile option":

Open profile option

Return to the usual display by clicking the "Exit profile option":

Exit profile option

Move the cursor into the wanted displayed image and mark the line along which the profile is to be shown:

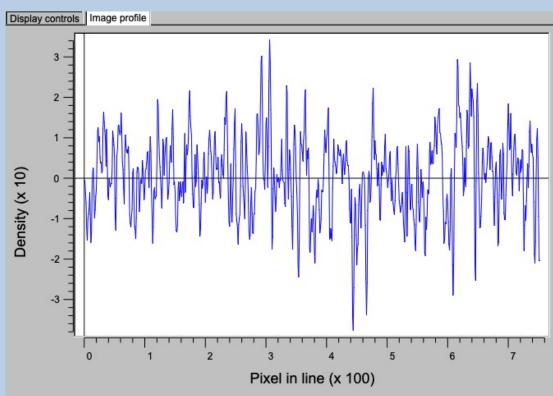


You can also specify the profile line by specifying the coordinates of the start and end point and the image location number:

Start		End		Location		
900	х	482	х	4	First	Update profile
185	Y	809	Y	4	Last	

Click the button "Update profile" to get the new profile





#### The profile is shown in the "image profile" tab.

If wanted you can store the profile in an IMAGIC PLT file:

Store profile

You have to specify the name of this PLT file:

**Output PLT file** 

my\_images\_profile

Return to the usual display by clicking the "Exit profile option":

Exit profile option



# **Display Options "Select"**

Get the "Select" options by clicking the button "Open select option":

Open select option

Return to the usual display by clicking the "Exit select option":

Exit select option

SELECT PARTICLES:

SELECT

Particles/Coordinates

O Images/Locations

Specify the name of the output file to store the chosen coordinates:

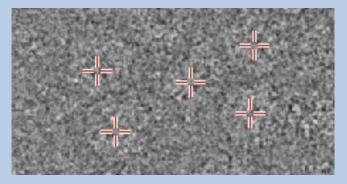
Output	PLT file
--------	----------

my\_images\_coordinates.plt

You can load the content of an already existing coordinates file in case you want to continue picking particles/storing coordinates:

Load particles/coordinates

Move the cursor into the displayed image on the right-hand side and click into the centre of the wanted particles:





Select particles for all images (image locations). To store the chosen coordinates click the button "Store particles/coordinates".

Store coordinates

If "Display" was called in an IMAGIC GUI program with all IMAGIC commands available you can use the button "CUT-IMAGE" to open the IMAGIC command to extract the selected particles:

CUT-IMAGES

Return to the usual display by clicking the "Exit select option":

Exit select option

SELECT IMAGES (IMAGE LOCATIONS):

SELECT

O Particles/Coordinates

Images/Locations

Specify the name of the file to store the chosen image (location) numbers:

#### Output PLT file

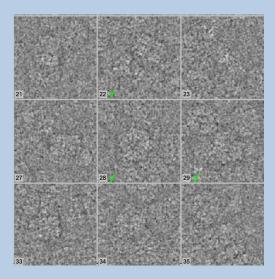
my\_micrograph\_locations.plt

You can load the content of an already existing locations file in case you want to continue selecting images (image locations):

Load images/locations numbers

Move the cursor into the displayed image on the right-hand side and click into the wanted image:





Select images for all galleries.. To store the chosen images (location numbers) click the button "Store images/locations".

Store images/locations numbers

If "Display" was called in an IMAGIC GUI program with all IMAGIC commands available you can use the button "EXTRACT-IMAGES" or "EXCLUDE-IMAGES" to open the IMAGIC command to extract the selected images:

EXTRACT-IMAGES

EXCLUDE-IMAGES

Return to the usual display by clicking the "Exit select option":

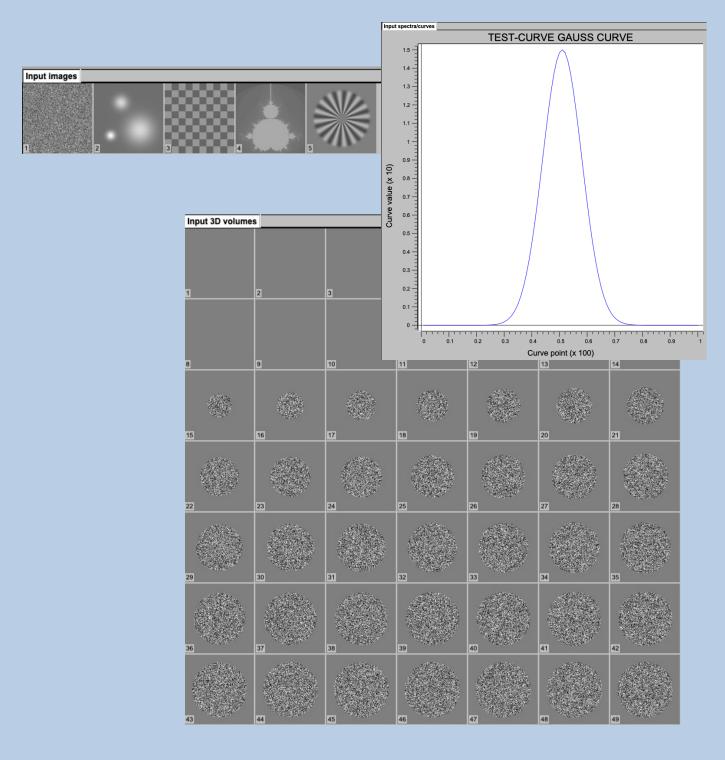
Exit select option



### Dimensions

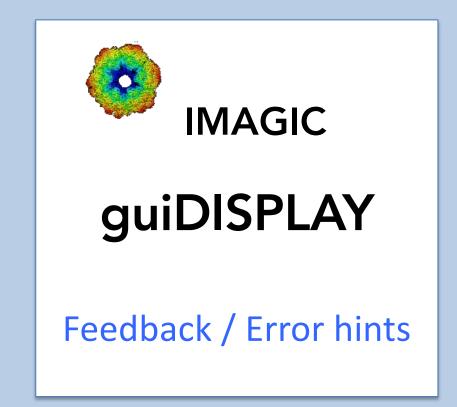
In the previous pages guiDISPLAY was described for images.

But input can also be curves/spectra/1D image or 3D volume(s) files. In this case the pages are modified for the other dimension but the content and the use of the pages are the same or similar.



IMAGIC guiDISPLAY - Hands-On





We intensively tested the **guiDISPLAY** 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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