

# Quick Start Guide to HiFi-SIM software

HiFi-SIM was implemented as a friendly Graphical User Interface (GUI) of MATLAB. The version provided here was developed on MATLAB R2014a version.

To facilitate the users to further analyze the reconstructed images, the calculation results of MATLAB are displayed in the graphics window of ImageJ through the open source plug-in **mij.jar** and **ij.jar**. A detailed discussion about the data exchange between MATLAB and ImageJ through mij.jar can be found from the following website: <http://bigwww.epfl.ch/sage/soft/mij/>

## Reference

Daniel Sage, Dimiter Prodanov, Jean-Yves Tinevez and Johannes Schindelin, "MIJ: Making Interoperability Between ImageJ and Matlab Possible", ImageJ User & Developer Conference, 24-26 October 2012, Luxembourg.

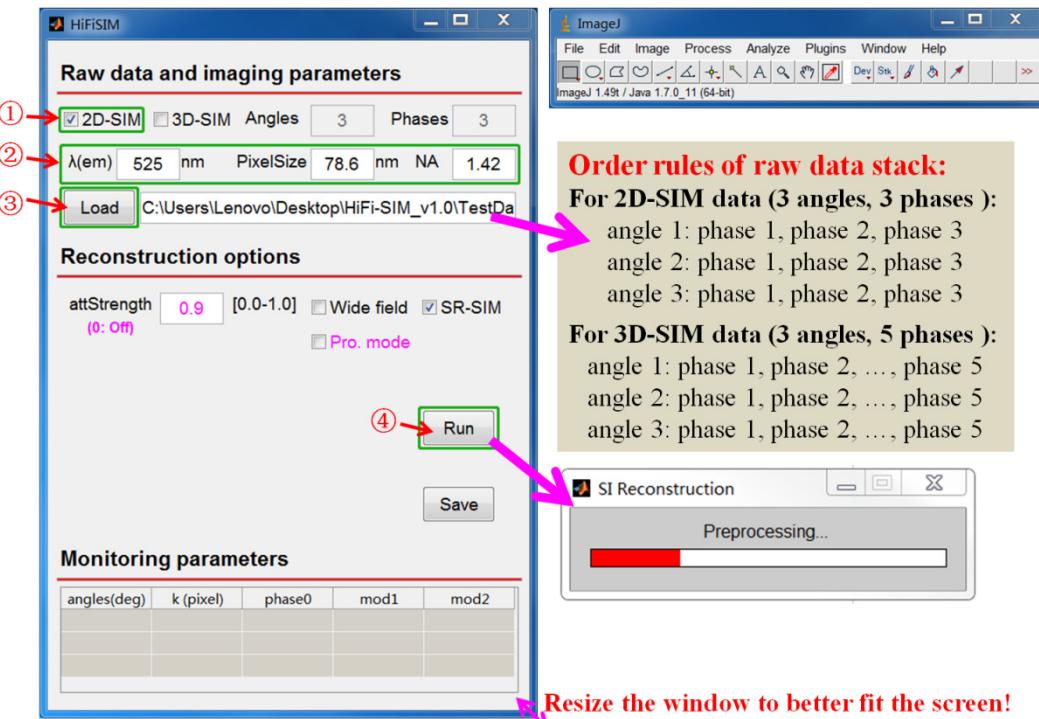
## Step 1: Install mij.jar and ij.jar in MATLAB and set up the path.

- Copy MIJ(interfacing imagej and matlab)\mij.jar into the java directory of MATLAB (e.g for Window Machine 'D:\Program Files\MATLAB\R2014a\java\').
- Copy MIJ(interfacing imagej and matlab)\ij.jar into the java directory of MATLAB.
- Open **Main.m** and expand the java classpath to mij.jar and ij.jar:

```
16 - javaaddpath 'D:\Program Files\MATLAB\R2014a\java\mij.jar'; % Note to replace the installation path
17 - javaaddpath 'D:\Program Files\MATLAB\R2014a\java\ij.jar'; % Note to replace the installation path
18 - MIJ.start;
19
20 %% RUN "HiFi-SIM"
21 HiFiSIM;
```

## Step 2: Save changes, and run the 'Main.m'.

## Step 3: Set the imaging parameters, load the raw data, and click the 'Run' button.



## Simple mode

- ◆ Set the parameter ‘attStrength’ and click ‘Run’ again.

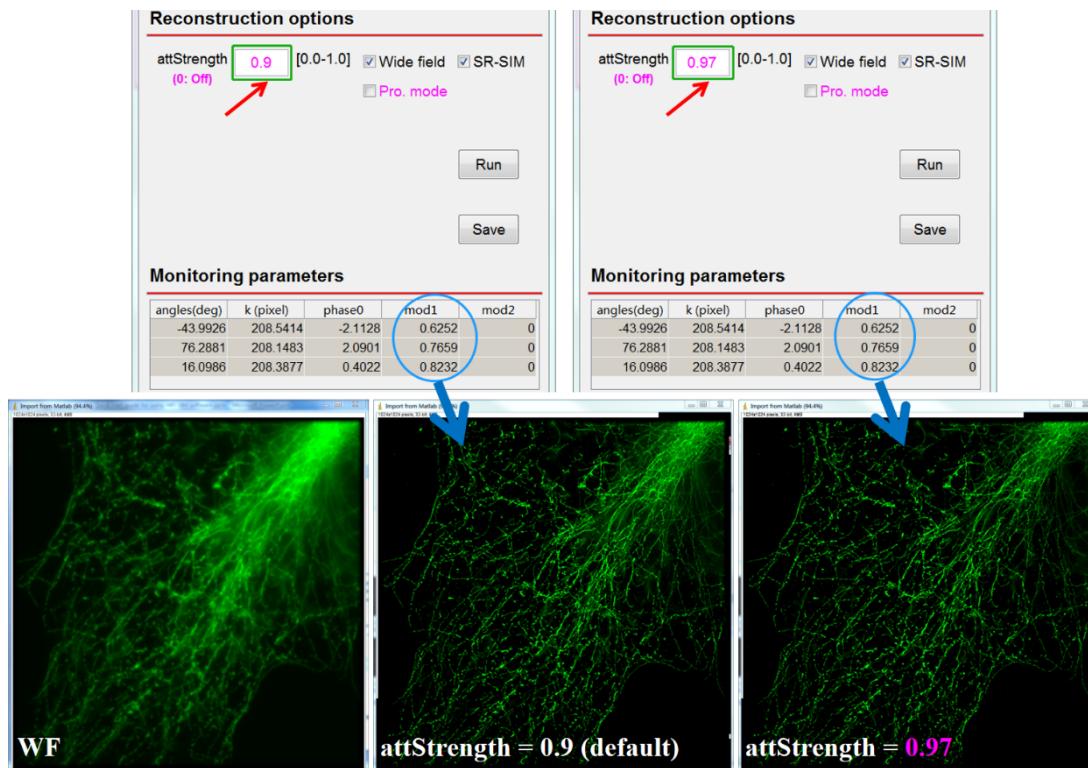
According to the residual background and artifacts in the initial reconstructed image of **Step 3**, the parameter **attStrength** is appropriately adjusted to obtain the optimal reconstruction quality.

We recommend using the estimated modulation factor as a criterion for evaluating the quality of the raw data:

- **mod<0.1:** Invalid data;
- **0.1<mod<0.5:** Data with suboptimal quality;
- **mod>0.5:** Data with acceptable quality.

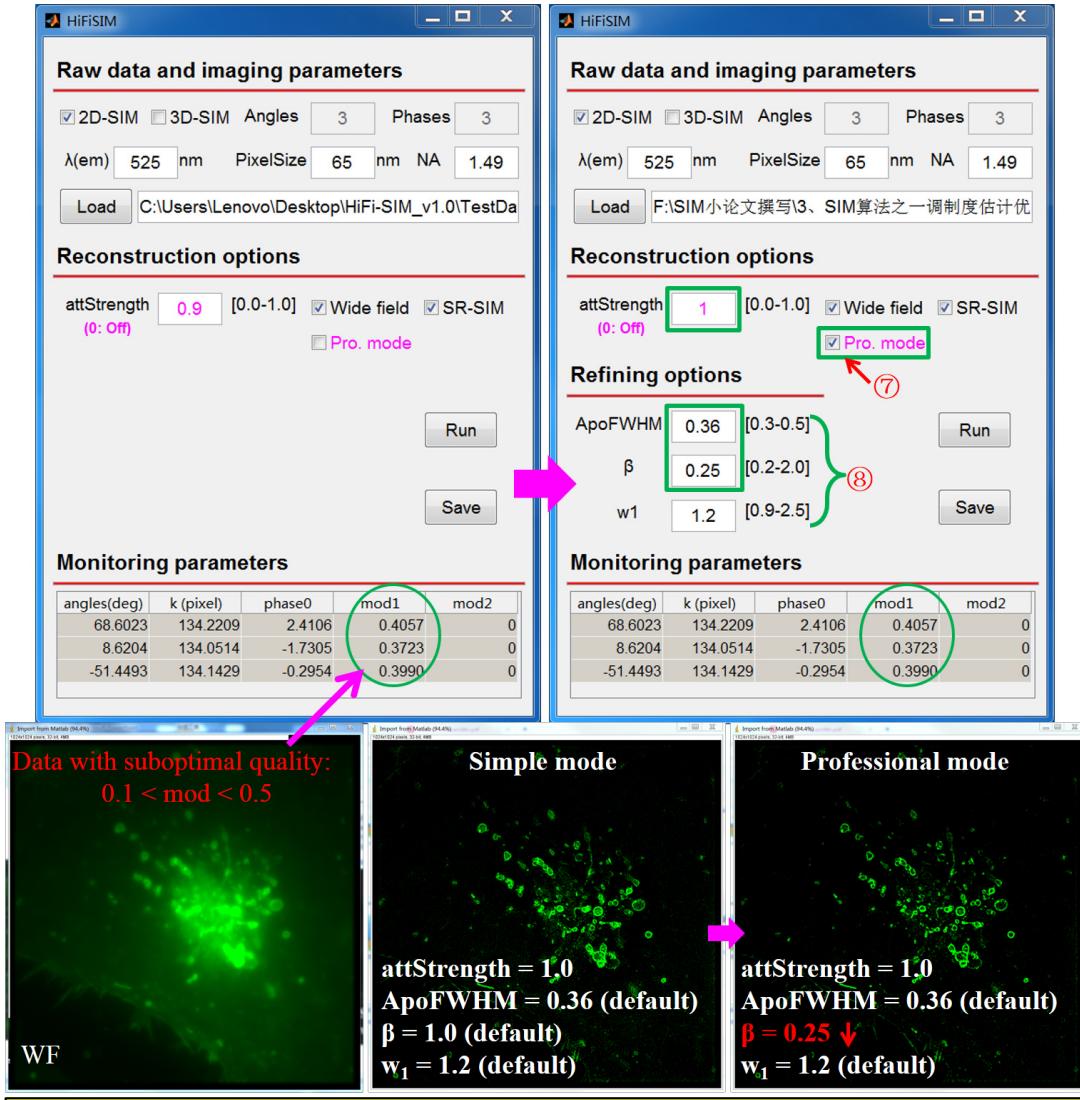
For data with **acceptable quality**, the **simple mode** is sufficient to reconstruct high-quality SR-SIM images.

## Example of Simple mode



## Professional mode

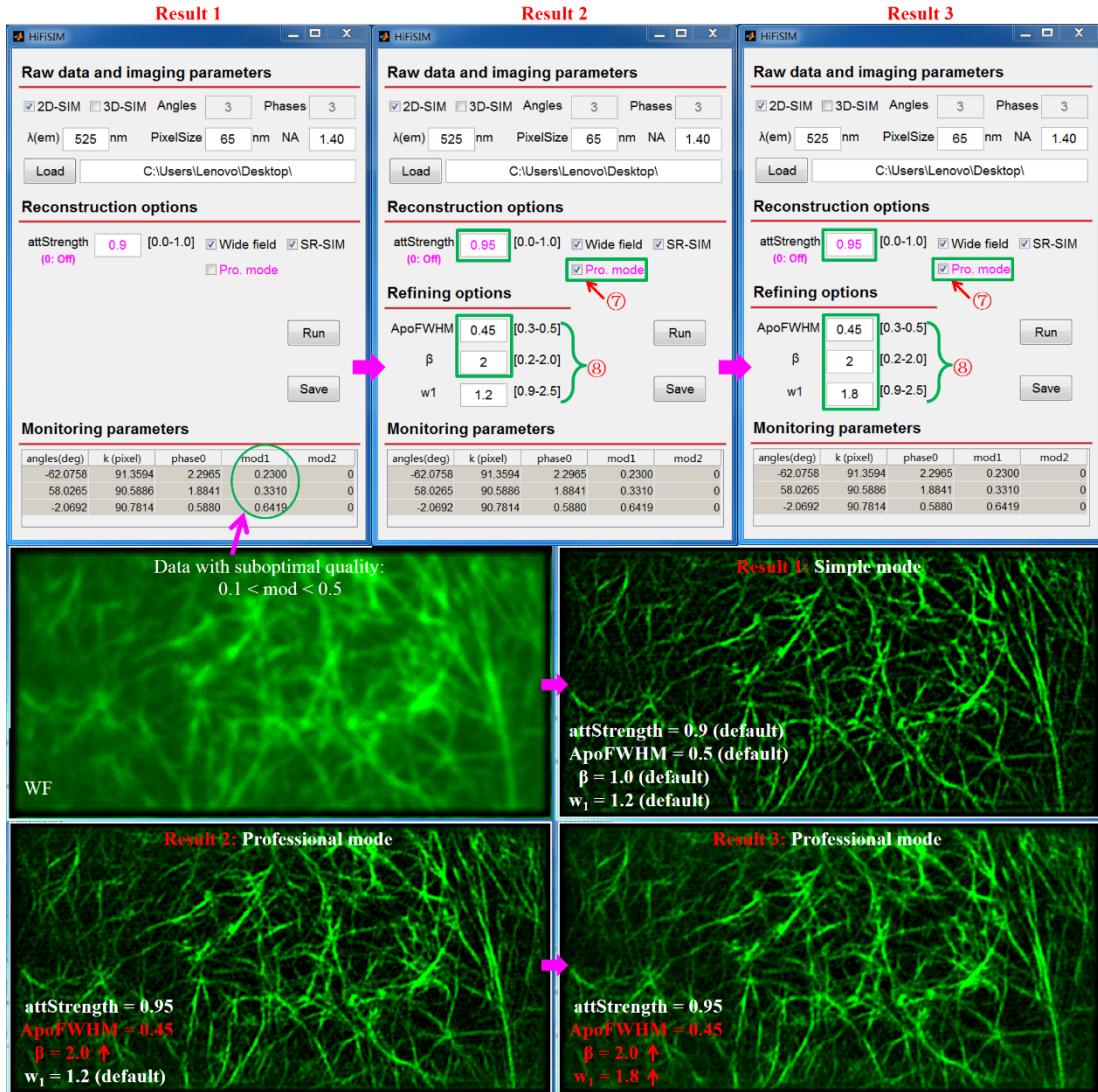
- ◆ Choose ‘Pro. mode’, set the parameters ‘attStrength’, ‘ApoFWHMM’, ‘ $\beta$ ’.



For data with suboptimal quality, the professional mode can further improve the quality of the reconstructed image.

For a detailed discussion of the professional mode, please see [Supplementary Note 3](#).

## Example of reconstructing low SNR data



The test data (Actin\_97hz\_0.5ms exposure raw data.tif) was downloaded from Hessian-SIM algorithm:

Huang, X. S. et al. Fast, long-term, super-resolution imaging with Hessian structured illumination microscopy. *Nat. Biotechnol.* **36**, 451–459 (2018).

## Example of reconstructing single-layer 3D-SIM data

