

Tutorial 1: First *in-silico* microscopy image

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1 Generate the the PSF

The point spread function $PSF(l', m', n')$ is generted using the following command

```
Tut1$ siliscopy gen_psf --method gandy --paramfile parameters.
      dat --calc all --output PSF_gandy --multiprocess
```

This reads the following variables from `parameters.dat`,

- beta, or NA and meu.
- dlmn
- Plmn
- fs
- lam[i]

If beta is absent in `parameters.dat`, it will look for NA and meu, and calculate beta using $\beta = \sin^{-1}(NA/\mu)$. The command above creates two PSF files for wavelength 670 nm and 518 nm.

- PSF_gandy_lam670_fs800.dat
- PSF_gandy_lam518_fs800.dat

2 Calculate *in-silico* monochrome image intensity

The *in-silico* monochrome image intensity $I(l', m')$ is calculated using,

```
Tut1$ siliscopy gen_mono --file dp100.gro --paramfile
      parameters.dat --psf PSF_gandy --output img100
Tut1$ siliscopy gen_mono --file dp2000.gro --paramfile
      parameters.dat --psf PSF_gandy --output img2000
```

This uses the PSF files generated in the previous step (`--psf PSF_gandy`), and reads the following variables from `parameters.dat`,

- `fs`
- `lam[i]`
- `lam_names[i]`
- `dlmn`
- `Plmn`
- `maxlen`
- `focus_cor`
- `opt_axis`
- `pb`

The command above generates image data files,

- `img100_lam670_fs800.dat`
- `img100_lam518_fs800.dat`
- `img2000_lam670_fs800.dat`
- `img2000_lam518_fs800.dat`

3 Generate monochrome *in-silico* microscopy images

Monochrome *In-silico* images can be generated using the following commands,

```
Tut1$ siliscopy plot --file img --paramfile parameters.dat --  
      method mono --timestep 100 --calc specific  
Tut1$ siliscopy plot --file img --paramfile parameters.dat --  
      method mono --timestep 2000 --calc specific
```

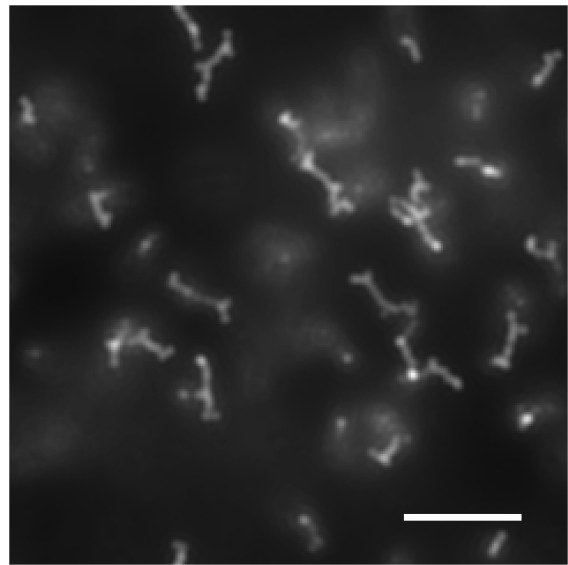
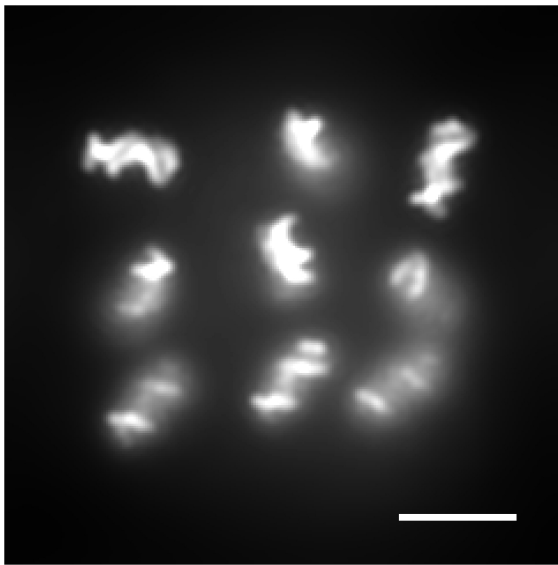
This reads the image intensity files calculated in the previous step, and reads the following variables from `parameters.dat`

- `fs`
- `lam[i]`
- `lam_IO_[i]`
- `T`

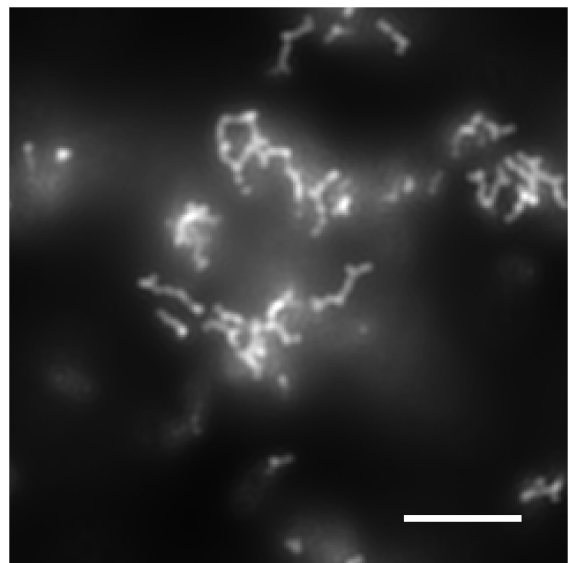
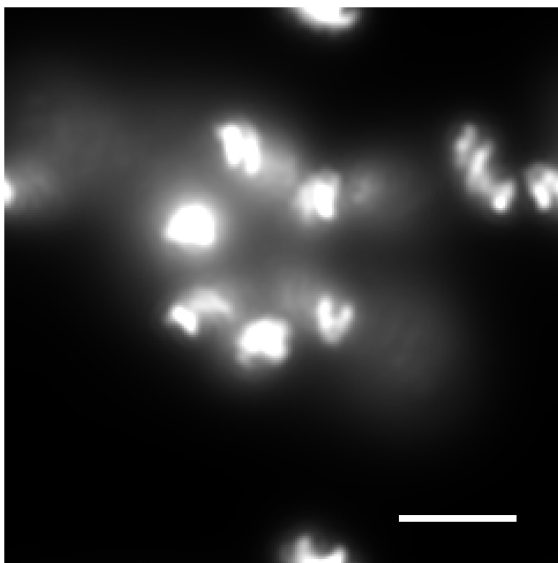
- dlmn
- maxlen
- scale
- dpi

The above command generates the following images:

- `img100_lam670_fs800_T1_I0.13.jpeg`, `img100_lam518_fs800_T1_I0.25.jpeg`



- `img2000_lam670_fs800_T1_I0.13.jpeg`, `img2000_lam518_fs800_T1_I0.25.jpeg`



4 Generate colored *in-silico* microscopy image.

Coloured *In-silico* images can be generated using the following commands,

```
Tut1$ siliscopy plot --file img --paramfile parameters.dat --  
    method color --timestep 100 --calc specific  
Tut1$ siliscopy plot --file img --paramfile parameters.dat --  
    method color --timestep 2000 --calc specific
```

This reads the image intensity files calculated in the previous step, and reads the following variables from `parameters.dat`

- `fs`
- `lam[i]`
- `lam_I0_[i]`
- `lam_hue[i]`
- `T`
- `dlnn`
- `maxlen`
- `scale`
- `dpi`

The above command generates the following images:

- `img100_fs800_T1_I_0.13_0.25.jpeg`, `img2000_fs800_T1_I_0.13_0.25.jpeg`

