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# 170324 smBLO meeting

서정훈, 허준석

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**"Video-rate nanoscopy using sCMOS camera-specific single-molecule localization algorithms" (Fang Huang, 2013)**

/storm\_analysis/sCMOS/

<http://www.nature.com/nmeth/journal/v10/n7/full/nmeth.2488.html>

**"Fast compressed sensing analysis for super-resolution imaging using L1-homotopy" (Babcock HP, 2013)**

/storm\_analysis/L1H/

<https://www.ncbi.nlm.nih.gov/pubmed/24514370>

**"A high-density 3D localization algorithm for stochastic optical reconstruction microscopy." (Hazen Babcock, 2012)**

/storm\_analysis/daostorm\_3D/

<https://optnano.springeropen.com/articles/10.1186/2192-2853-1-6>

**"Density-based spatial clustering of applications with noise (DBSCAN)" (Martin Ester, 1996)**

/storm\_analysis/dbscan/

<http://www.aaai.org/Papers/KDD/1996/KDD96-037.pdf>

## **"Statistical Deconvolution for Superresolution Fluorescence Microscopy" (Mukamel EA, 2012)**

/storm\_analysis/decon\_storm/

<https://www.ncbi.nlm.nih.gov/pubmed/22677393>

## **"A Fast Iterative Shrinkage-Thresholding Algorithm for Linear Inverse Problems" (Amir Beck, 2009)**

/storm\_analysis/fista/

<http://epubs.siam.org/doi/abs/10.1137/080716542?journalCode=sjisbi>

**"Measuring image resolution in optical nanoscopy"  
(Nieuwenhuizen, 2013)**

/storm\_analysis/frc/

<http://www.nature.com/nmeth/journal/v10/n6/abs/nmeth.2448.html>

**"Localization events-based sample drift correction for  
localization microscopy with redundant cross-correlation  
algorithm"(Yina Wang, 2014)**

/storm\_analysis/rcc/

<https://www.osapublishing.org/oe/abstract.cfm?uri=oe-22-13-15982>

# **"Analyzing Single Molecule Localization Microscopy Data Using Cubic Splines" (Hazen Babcock, 2016)**

/storm\_analysis/spliner/

<http://biorxiv.org/content/early/2016/11/28/083402>

# **"SR-Tesseler: a method to segment and quantify localization-based super-resolution microscopy data" (Levet F, 2015)**

/storm\_analysis/voronoi/

<https://www.ncbi.nlm.nih.gov/pubmed/26344046>

# **"An Iterative Algorithm for Background Removal in Spectroscopy by Wavelet Transforms" (Galloway CM, 2009)**

/storm\_analysis/wavelet\_bgr/

<https://www.ncbi.nlm.nih.gov/pubmed/20030982>

**sa\_library** - A collection of Python (and C) libraries that provide functionality whose utility is not limited to just a support role for 3D-DAOSTORM (and other analysis approaches).

**sa\_utilities** - A collection of Python and C programs that perform functions such as tracking single molecules across multiple frames or determining and applying drift correction. These are used by 3D-DAOSTORM, but as with the functions in the library directory they are considered to be of more general utility.

**simulator** - A simple simulator for generating test data.

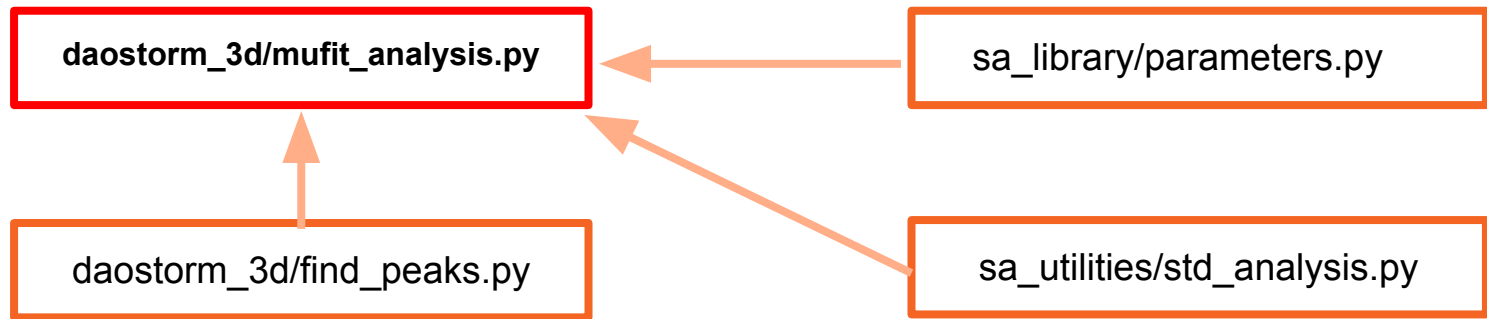
**tests** - Simple tests of 3D-DAOSTORM, sCMOS and other programs to verify that they work. This might also be a good place to look to get an idea of how different programs are run.

**visualizer** - A PyQt5 based application that draws the found localizations on frame in which they were found.

**c\_libraries** - The location of the C libraries once they have been built. This also contains DLLs that you may need to get this package to work on windows (LAPACK, FFTW).

**rolling\_ball\_bgr** - The core code to perform rolling ball based background estimation.





daostorm\_3d/find\_peaks.py

sa\_library/fitting.py

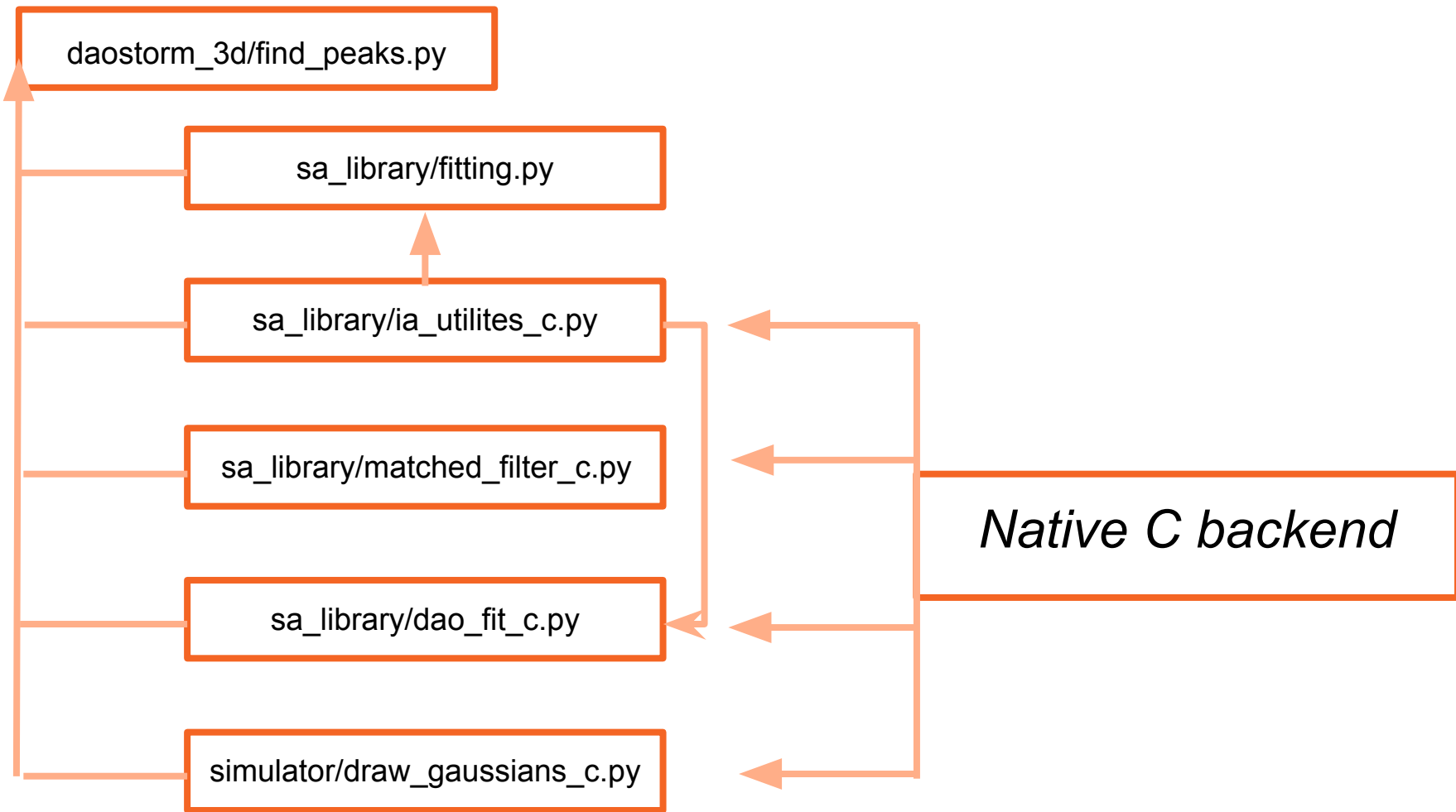
sa\_library/ia\_utilites\_c.py

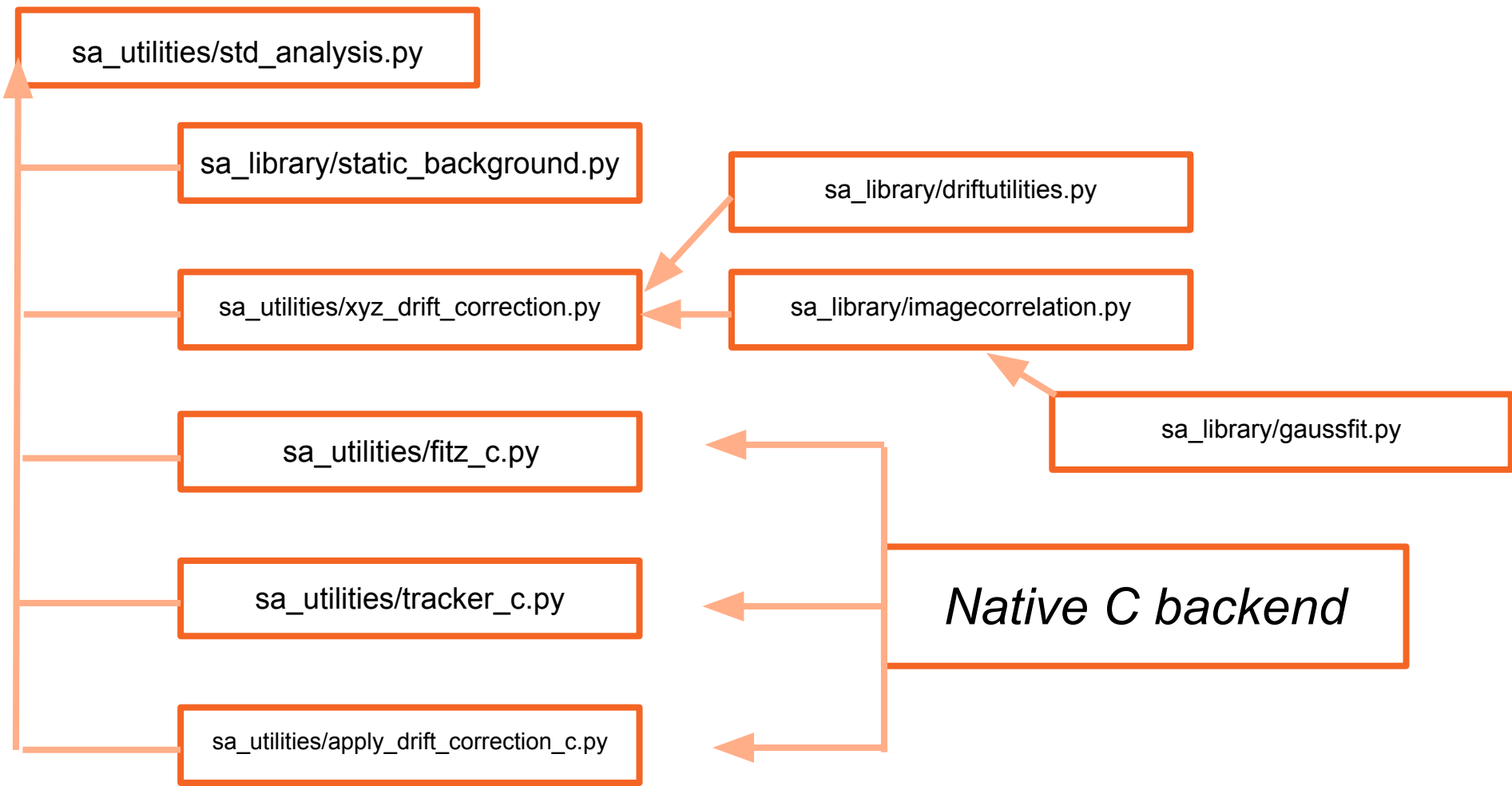
sa\_library/matched\_filter\_c.py

sa\_library/dao\_fit\_c.py

simulator/draw\_gaussians\_c.py

*Native C backend*





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simulator/simulate.py

```
parser = argparse.ArgumentParser(description = "A simple simulation example.")

parser.add_argument('--dax', dest='dax_file', type=str, required=True,
                    help = "The name of the dax file to save the simulated STORM movie.")
parser.add_argument('--bin', dest='i3bin', type=str, required=True,
                    help = "The name of the Insight3 file containing the emitter locations.")
parser.add_argument('--frames', dest='frames', type=int, required=True,
                    help = "The length of the movie in frames.")
parser.add_argument('--photons', dest='photons', type=float, required=True,
                    help = "The integral of a single emitter in photons.")
```

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simulator/emitters\_on\_grid.py

```
parser = argparse.ArgumentParser(description = "Create a grid of emitters for simulations.")

parser.add_argument('--bin', dest='i3bin', type=str, required=True,
                    help = "The name of Insight3 format file to save the emitter locations, etc.")
parser.add_argument('--nx', dest='nx', type=int, required=True,
                    help = "The grid size in X.")
parser.add_argument('--ny', dest='ny', type=int, required=True,
                    help = "The grid size in Y.")
parser.add_argument('--spacing', dest='spacing', type=float, required=True,
                    help = "The grid spacing in pixels.")
parser.add_argument('--zrange', dest='zrange', type=float, required=False, default = 0.0,
                    help = "Range for z values in nm, -zrange to zrange")
```

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```
python emitters_on_grid.py --bin example.bin --nx 5 --ny 5  
--spacing 1.0 --zrange 1.0  
('Added', 25)
```

```
python simulate.py --dax example.dax --bin example.bin --frame 10 --photons 200  
('Version:', 'M425')  
('Frames:', 1)  
('Status:', 6)  
('Molecules:', 25)
```

```
('Frame', 0, 25, 'emitters')  
('Frame', 1, 25, 'emitters')  
('Frame', 2, 25, 'emitters')  
('Frame', 3, 25, 'emitters')  
('Frame', 4, 25, 'emitters')  
('Frame', 5, 25, 'emitters')  
('Frame', 6, 25, 'emitters')  
('Frame', 7, 25, 'emitters')  
('Frame', 8, 25, 'emitters')  
('Frame', 9, 25, 'emitters')  
('Added', 250)
```