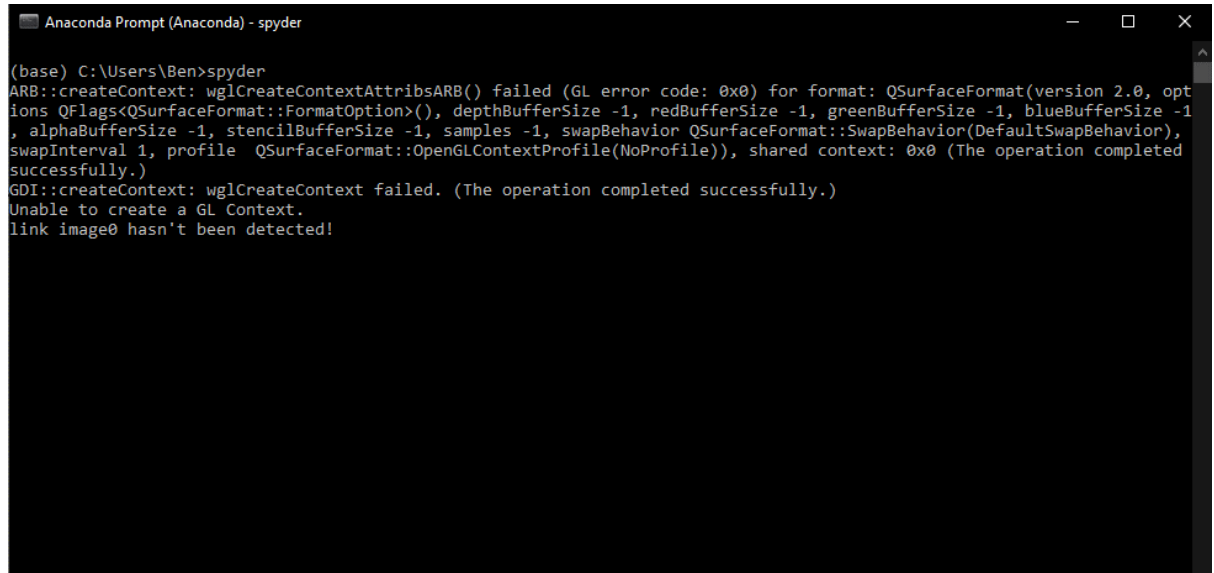


Getting started with pSHG data analysis

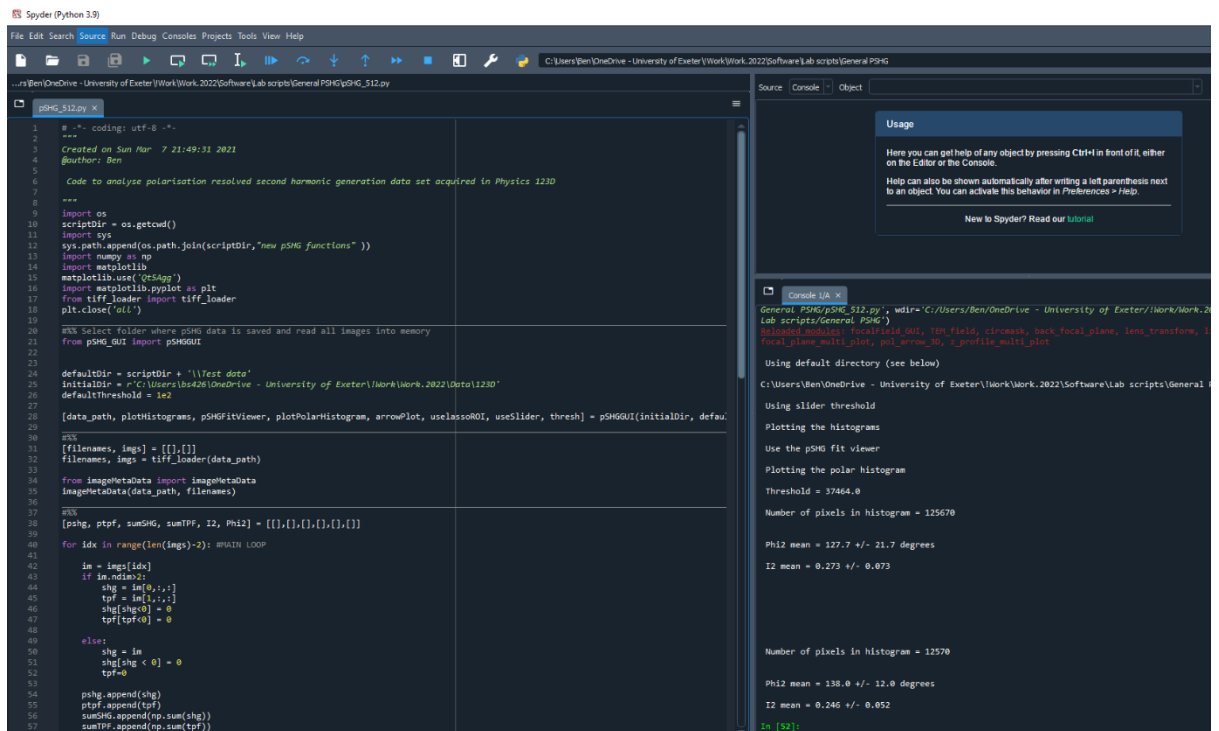
1. Download and install python using <https://www.anaconda.com/>
2. Open anaconda terminal by pressing windows key and typing in “anaconda”



```
Anaconda Prompt (Anaconda) - spyder

(base) C:\Users\Ben>spyder
ARB::createContext: wglCreateContextAttribsARB() failed (GL error code: 0x0) for format: QSurfaceFormat(version 2.0, opt
ions QFlags<QSurfaceFormat::FormatOption>(), depthBufferSize -1, redBufferSize -1, greenBufferSize -1, blueBufferSize -1
, alphaBufferSize -1, stencilBufferSize -1, samples -1, swapBehavior QSurfaceFormat::SwapBehavior(DefaultSwapBehavior),
swapInterval 1, profile QSurfaceFormat::OpenGLContextProfile(NoProfile)), shared context: 0x0 (The operation completed
successfully.)
GDI::createContext: wglCreateContext failed. (The operation completed successfully.)
Unable to create a GL Context.
link image0 hasn't been detected!
```

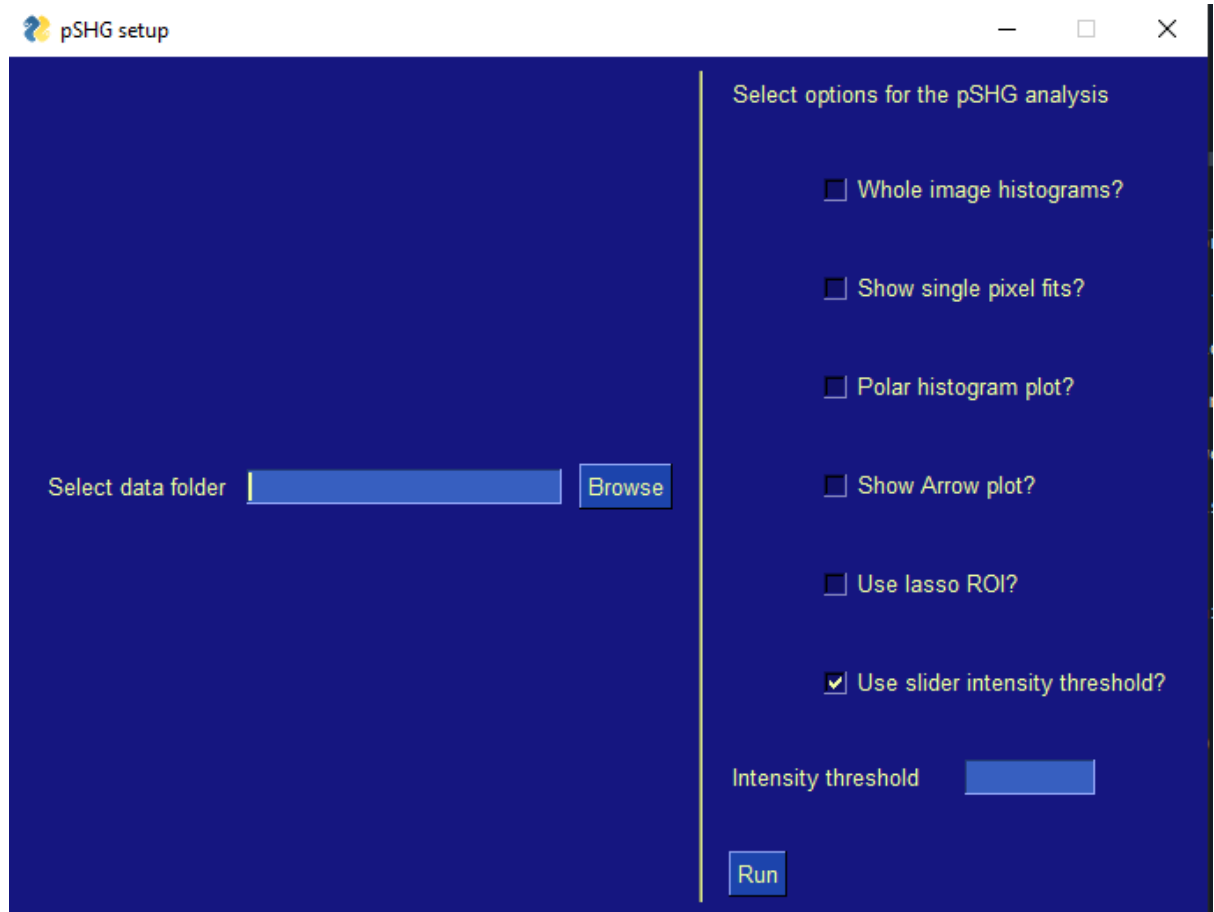
3. Type “pip install natsort” (and press ‘y’ if prompted about whether any changes are ok)
4. Type “pip install scanimage-tiff-reader” (and press ‘y’ if prompted about whether any changes are ok)
5. Type “pip install pysimplegui” (and press ‘y’ if prompted about whether any changes are ok)
6. Type “spyder” to open MATLAB like development environment



```
Spyder (Python 3.9)
File Edit Search Source Run Debug Consoles Projects Tools View Help
C:\Users\Ben\OneDrive - University of Exeter\Work\2022\Software\Lab scripts\General pSHG
...r\Ben\OneDrive - University of Exeter\Work\2022\Software\Lab scripts\General pSHG_512.py

pSHG_512.py
1 # -*- coding: utf-8 -*-
2 """
3 Created on Sun Mar 7 21:49:31 2021
4 Author: Ben
5
6 Code to analyse polarisation resolved second harmonic generation data set acquired in Physics 1230
7
8 """
9 import os
10 scriptDir = os.getcwd()
11 import sys
12 sys.path.append(os.path.join(scriptDir, "new pSHG_functions" ))
13 import numpy as np
14 import matplotlib
15 matplotlib.use('Qt5Agg')
16 import matplotlib.pyplot as plt
17 from tiff_loader import tiff_loader
18 plt.close('all')
19
20 #%% Select folder where pSHG data is saved and read all images into memory
21 from pSHG_GUI import pSHGGUI
22
23
24 defaultDir = scriptDir + '\\Test data'
25 initialDir = r"C:\Users\ben426\OneDrive - University of Exeter\Work\2022\Data\1230"
26 defaultThreshold = 1e2
27
28 [data_path, plotHistograms, pSHGFitViewer, plotPolarHistogram, arrowPlot, useLassoROI, useSlider, thresh] = pSHGGUI(initialDir, defau
29
30
31 #%%
32 [filenames, imgs] = [ [], [] ]
33 filenames, imgs = tiff_loader(data_path)
34
35 from imageMetadata import imageMetadata
36 imageMetadata(data_path, filenames)
37
38 #%%
39 [pshg, ptpf, sumSHG, sumTPF, I2, Phi2] = [ [], [], [], [], [], [] ]
40
41 for idx in range(len(imgs)-2): #MAIN LOOP
42
43     im = imgs[idx]
44     if im.ndim>2:
45         shg = im[:, :, 1]
46         tpf = im[:, :, 2]
47         shg[shg<0] = 0
48         tpf[tpf<0] = 0
49
50     else:
51         shg = im
52         shg[shg<0] = 0
53         tpf=0
54
55     pshg.append(shg)
56     ptpf.append(tpf)
57     sumSHG.append(np.sum(shg))
58     sumTPF.append(np.sum(tpf))
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8. A GUI should appear that allows you select the folder where the data to be analysed is saved, along with the type of analysis you would like to see. Note that if no folder is selected, a default folder is used called “Test data” that is in the same folder as this analysis code. The test data contains a pSHG data set of some rat tail tendon.



9. Note that if you select the “Show single pixel fits” option, a window will appear that you must click in 6 times before the code will continue. The raw data and the pSHG ‘fit’ at each location that in the image that you click on will be shown in one of the saved figures.
10. Figures and processed data are saved in the raw data folder

| Organise New Open Select | | | | | | |
|--|--------|------------------|----------------------|----------|------|--|
| Drive - University of Exeter > !Work > Work.2022 > Software > Lab scripts > General PSHG > Test data | | | | | | |
| Name | Status | Date | Type | Size | Tags | |
| fit results | ✓ | 20/06/2022 16:08 | File folder | | | |
| lasso ROI results | ✓ | 15/06/2022 09:28 | File folder | | | |
| fit viewer.png | ✓ | 14/06/2022 17:08 | PNG File | 114 KB | | |
| HWPandQWP ZF030 PBF20 RTT_00001.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
| HWPandQWP ZF030 PBF20 RTT_00002.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
| HWPandQWP ZF030 PBF20 RTT_00003.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
| HWPandQWP ZF030 PBF20 RTT_00004.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
| HWPandQWP ZF030 PBF20 RTT_00005.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
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| HWPandQWP ZF030 PBF20 RTT_00011.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
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| HWPandQWP ZF030 PBF20 RTT_00014.tif | ✓ | 14/01/2022 09:45 | TIF File | 1,036 KB | | |
| I2 as fn of intensity threshold in RTT test data.xlsx | ✓ | 24/06/2022 21:08 | Microsoft Excel W... | 16 KB | | |
| I2 histogram.png | ✓ | 10/02/2022 11:35 | PNG File | 30 KB | | |
| I2 histogramData.xlsx | ✓ | 11/07/2022 11:44 | Microsoft Excel W... | 1,894 KB | | |
| Image meta data.txt | ✓ | 11/07/2022 11:43 | Text Document | 1 KB | | |
| Phi2 histogram.png | ✓ | 10/02/2022 11:35 | PNG File | 32 KB | | |
| Phi2 histogramData.xlsx | ✓ | 11/07/2022 11:44 | Microsoft Excel W... | 1,886 KB | | |
| Phi2 polar plot.png | ✓ | 14/06/2022 23:02 | PNG File | 88 KB | | |
| pSHG Arrows.png | ✓ | 14/06/2022 17:10 | PNG File | 556 KB | | |
| pSHG multipanel.png | ✓ | 14/06/2022 22:34 | PNG File | 298 KB | | |

11.