Beamtime2_Bi2212

September 26, 2022

```python
[1]: from arpes.io import load_data
     import os.path
```

```
C:\Users\hellbrue\Documents\Repositories\pyarpes\arpes\config.py:54:
UserWarning: Could not find local configuration file. If you don't have one, you
can safely ignore this message.
  warnings.warn(msg)

Activating auto-logging. Current session state plus future input saved.
Filename       : logs\unnamed_2022-09-26_15-14-34.log
Mode           : backup
Output logging : False
Raw input log  : False
Timestamping   : False
State          : active
```

1 Quick overview of Bi2212 Data from 2nd Beamtime at PSI

This notebook covers a basic overview of the Bi2212 data taken at the 2nd beamtime at PSI. It will show the observed EDCs of Bi2212 and Gold and the FS of Bi2212. The Gold measurements were taken to have a reference for the Fermi Level of all Data taken on this beamtime.

1.1 EDC of Bi2212 at normal emission

```python
[2]: # Define directory
     path = os.path.abspath("G:\My Drive\Bi2223\e19557\Beamtime2\Sample4\Bi2212")

     # Different parameters used to set up scans at SLS
     scan_type = 'EDC'
     direction = '*'
     phi = '*'
     energy = '*'+'eV'
     polarization = '*'
     temp = '*'
     e_pass = '*'+'eVpass'
     comment = ''
     run = '*'.zfill(4)
```

```python
# Put together string for finding file
phi = phi.replace('+', 'P').replace('-', 'M').replace('.', 'p')
energy = energy.replace('.', 'p')
parameters = [scan_type, direction, phi, energy, polarization, temp, e_pass,
 ↪comment, run]
if comment == '':
    parameters.remove(comment)
file_type = 'h5'
file_name = '_'.join(parameters)
file = '.'.join([file_name , file_type])

full_file = os.path.join(path, file)
file
```

[2]: `'EDC_*_*_*eV_*_*_*eVpass_000*.h5'`

[3]:
```python
import glob
# Load all files with above specified parameters, * is a placeholder and
 ↪imports all files in its place
files = glob.glob(full_file)
print(len(files))
files
```

```
1
```

[3]:
```
['G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\EDC_AN_M31_27eV_CIRC
P_LT_20eVpass_0000.h5']
```

[4]:
```python
data_list = {}
for file in files:
    #data_list.append(load_data(file, location="ULTRA"))
    data = load_data(file, location="ULTRA")
    file_name = file.replace(path, '')[1:-3]
    data_list.update({file_name : data})
```
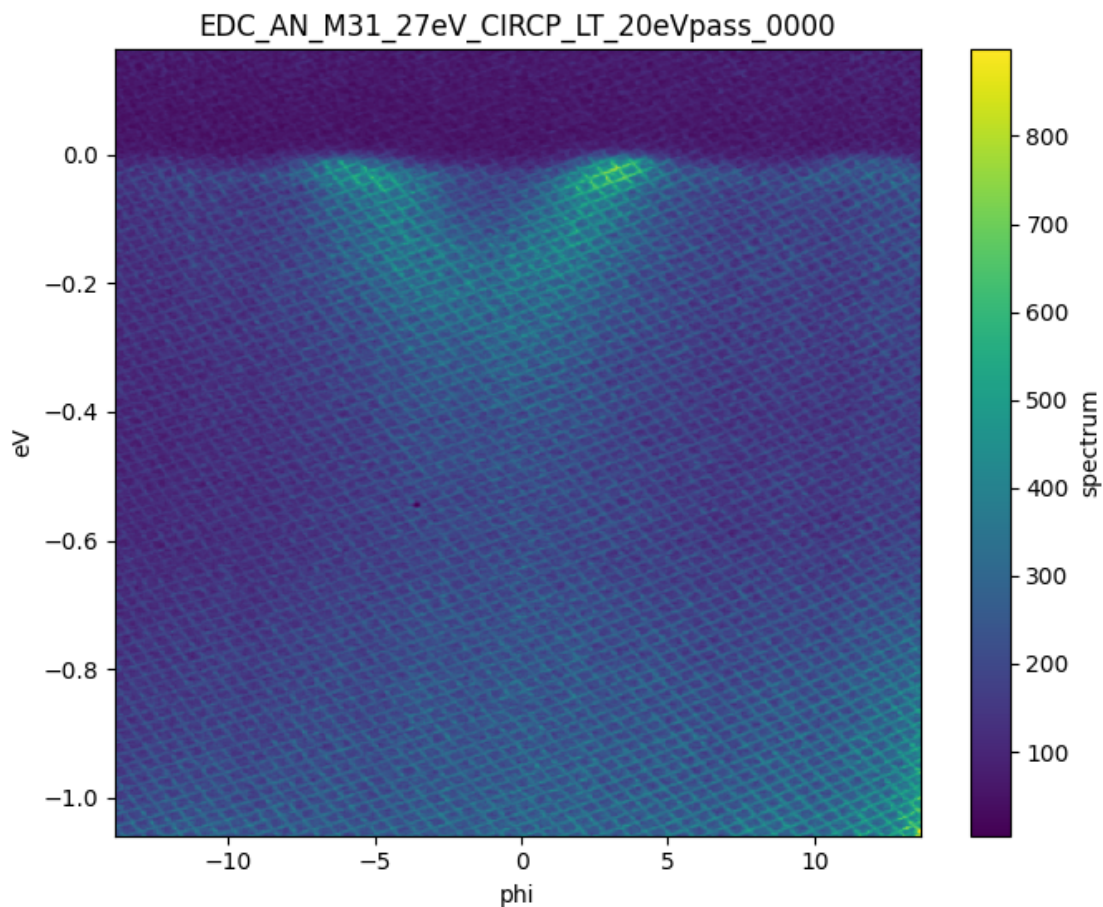
[5]:
```python
import matplotlib.pyplot as plt
import math
rows = math.ceil(len(data_list) / 3)
fig, ax = plt.subplots(1, 1, figsize=(7, 6))

for key in data_list.keys():
    data_list[key].spectrum.S.plot()
    ax.set_title(f"{key}")

plt.tight_layout(rect=[0, 0.03, 1, 0.98])
```

EDC_AN_M31_27eV_CIRCP_LT_20eVpass_0000

1.2 EDCs of Bi2212 at different Tilts

```python
# Define directory
path = os.path.abspath("G:\My Drive\Bi2223\e19557\Beamtime2\Sample4\Bi2212")

# Different parameters used to set up scans at SLS
scan_type = 'EDC'
direction = '*'
phi = '*'
energy = '*'
polarization = '*'
temp = '*'
e_pass = '*'+'eVpass'
comment = 'TILT*'
run = '*'.zfill(4)

# Put together string for finding file
```

```python
parameters = [scan_type, direction, phi, energy, polarization, temp, e_pass,
 ↪comment, run]
if comment == '':
    parameters.remove(comment)
file_type = 'h5'
file_name = '_'.join(parameters)
file = '.'.join([file_name , file_type])

full_file = os.path.join(path, file)
file
```

[6]: `'EDC_*_*_*_*_*_*eVpass_TILT*_000*.h5'`

```python
import glob
# Load all files with above specified parameters, * is a placeholder and
 ↪imports all files in its place
files = glob.glob(full_file)
print(len(files))
files
```

    2

[7]: ```
['G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\EDC_AN_M31_27eV_CIRC
P_LT_20eVpass_TILTM4_0000.h5',
 'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\EDC_AN_M31_27eV_CIRC
P_LT_20eVpass_TILTM2_0000.h5']
```

[8]: ```python
data_list = {}
for file in files:
    #data_list.append(load_data(file, location="ULTRA"))
    data = load_data(file, location="ULTRA")
    file_name = file.replace(path, '')[1:-3]
    data_list.update({file_name : data})
```
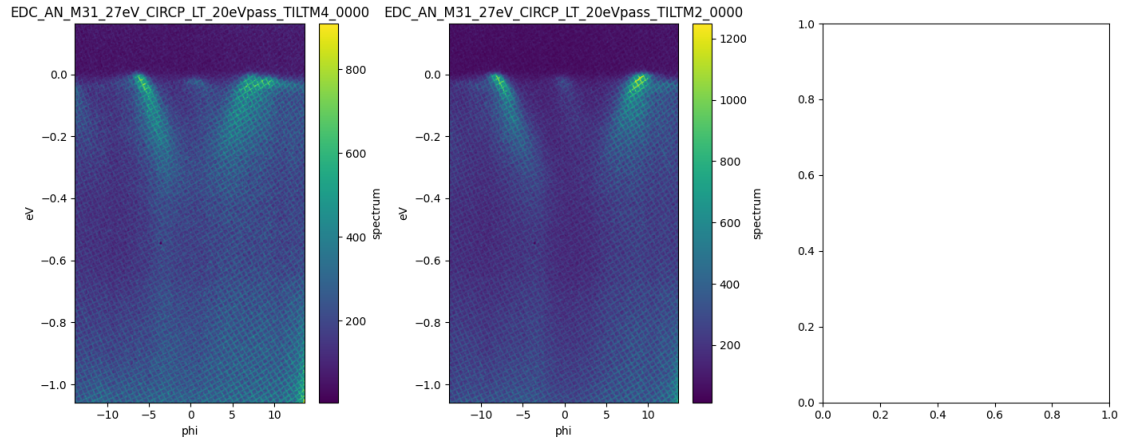
[9]: ```python
import matplotlib.pyplot as plt
import math
rows = math.ceil(len(data_list) / 3)
fig, ax = plt.subplots(rows, 3, figsize=(14, 6*rows))

for key in data_list.keys():
    data_list[key].spectrum.S.plot(ax=ax.ravel()[list(data_list).index(key)])
    ax.ravel()[list(data_list).index(key)].set_title(f"{key}")

plt.tight_layout(rect=[0, 0.03, 1, 0.98])
```

## 1.3 EDCs of Gold reference sample

```
[10]: # Define directory
      path = os.path.abspath("G:\My Drive\Bi2223\e19557\Beamtime2\Sample4\Bi2212")

      # Different parameters used to set up scans at SLS
      scan_type = 'EDC'
      direction = '*'
      phi = '*'
      energy = '*'+'eV'
      polarization = '*'
      temp = '*'
      e_pass = '*'+'eVpass'
      comment = 'GoldRef*'
      run = '*'.zfill(4)

      # Put together string for finding file
      phi = phi.replace('+', 'P').replace('-', 'M').replace('.', 'p')
      energy = energy.replace('.', 'p')
      parameters = [scan_type, direction, phi, energy, polarization, temp, e_pass,␣
        ↪comment, run]
      if comment == '':
          parameters.remove(comment)
      file_type = 'h5'
      file_name = '_'.join(parameters)
      file = '.'.join([file_name , file_type])

      full_file = os.path.join(path, file)
      file
```

```
[10]: 'EDC_*_*_*eV_*_*_*eVpass_GoldRef*_000*.h5'
```

```
[11]: import glob
      # Load all files with above specified parameters, * is a placeholder and␣
      ↪imports all files in its place
      files = glob.glob(full_file)
      print(len(files))
      files
```

3

```
[11]: ['G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\EDC_X_M0_26p5eV_CIRC
      P_LT_20eVpass_GoldRef 2_0000.h5',
       'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\EDC_X_M0_25eV_CIRCP_
      LT_20eVpass_GoldRef 3_0000.h5',
       'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\EDC_X_M0_27eV_CIRCP_
      LT_20eVpass_GoldRef_0000.h5']
```

```
[12]: data_list = {}
      for file in files:
          #data_list.append(load_data(file, location="ULTRA"))
          data = load_data(file, location="ULTRA")
          file_name = file.replace(path, '')[1:-3]
          data_list.update({file_name : data})
```

```
[13]: import matplotlib.pyplot as plt
      import math
      rows = math.ceil(len(data_list) / 3)
      fig, ax = plt.subplots(rows, 3, figsize=(14, 6*rows))

      for key in data_list.keys():
          data_list[key].spectrum.S.plot(ax=ax.ravel()[list(data_list).index(key)])
          ax.ravel()[list(data_list).index(key)].set_title(f"{key}")
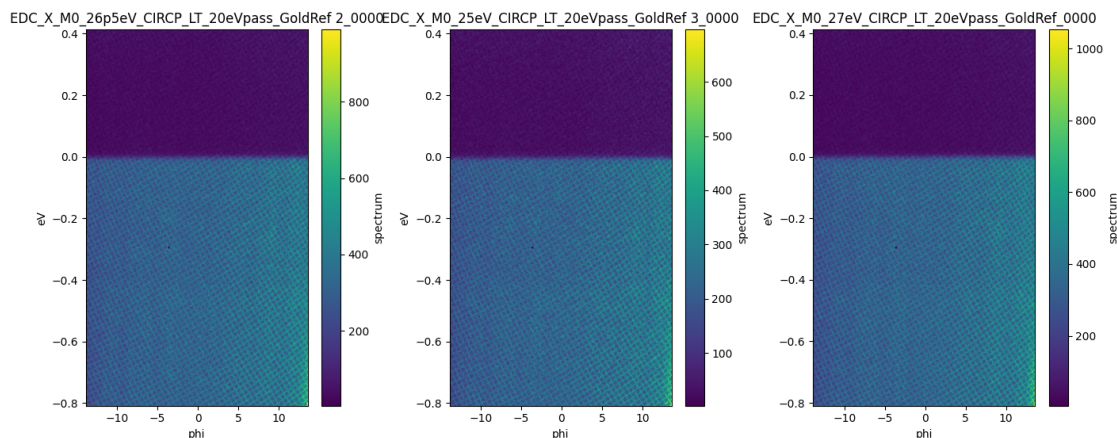
      plt.tight_layout(rect=[0, 0.03, 1, 0.98])
```

1.4 FS maps of Bi2212

```
[14]: # Define directory
      path = os.path.abspath("G:\My Drive\Bi2223\e19557\Beamtime2\Sample4\Bi2212")

      # Different parameters used to set up scans at SLS
      scan_type = 'FS'
      direction = '*'
      phi = '*'
      energy = '*'+'eV'
      polarization = '*'
      temp = '*'
      e_pass = '*'+'eVpass'
      comment = ''
      run = '*'.zfill(4)

      # Put together string for finding file
      phi = phi.replace('+', 'P').replace('-', 'M').replace('.', 'p')
      energy = energy.replace('.', 'p')
      parameters = [scan_type, direction, phi, energy, polarization, temp, e_pass,⊔
       ↪comment, run]
      if comment == '':
          parameters.remove(comment)
      file_type = 'h5'
      file_name = '_'.join(parameters)
      file = '.'.join([file_name , file_type])

      full_file = os.path.join(path, file)
      file
```

```
[14]: 'FS_*_*_*eV_*_*_*eVpass_000*.h5'
```

```
[15]: import glob
      # Load all files with above specified parameters, * is a placeholder and⊔
       ↪imports all files in its place
      files = glob.glob(full_file)
      print(len(files))
      files
```

```
      6
```

```
[15]: ['G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\FS_N_P18_27eV_CIRCP_
      LT_20eVpass_0000.h5',
       'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\FS_N_M76_27eV_CIRCP_
      LT_20eVpass_0001.h5',
       'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\FS_N_M76_27eV_CIRCP_
```

```
LT_20eVpass_0000.h5',
 'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\FS_AN_P16p5_25eV_CIR
CP_LT_20eVpass_0000.h5',
 'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\FS_AN_M31_27eV_CIRCP
_LT_20eVpass_0001.h5',
 'G:\\My Drive\\Bi2223\\e19557\\Beamtime2\\Sample4\\Bi2212\\FS_AN_M31_27eV_CIRCP
_LT_20eVpass_0000.h5']
```

[16]:
```python
data_list = {}
for file in files:
    #data_list.append(load_data(file, location="ULTRA"))
    data = load_data(file, location="ULTRA")
    file_name = file.replace(path, '')[1:-3]
    data_list.update({file_name : data})
```

[17]:
```python
import matplotlib.pyplot as plt
import math
rows = math.ceil(len(data_list) / 2)
fig, ax = plt.subplots(rows, 2, figsize=(14, 6*rows))

for key in data_list.keys():
    data = data_list[key].spectrum
    fs = data.sel(eV=slice(-0.02,0.02)).sum("eV")
    fs.plot(ax=ax.ravel()[list(data_list).index(key)])
    ax.ravel()[list(data_list).index(key)].set_title(f"{key}")

plt.tight_layout(rect=[0, 0.03, 1, 0.98])
```