

Overview_EDCs

September 26, 2022

```
[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_16-03-38.log  
Mode : backup  
Output logging : False  
Raw input log : False  
Timestamping : False  
State : active
```

1 Overview of EDCs of Bi2223 measured at 1. Beamtime

The notebook shows a overview of the various different EDC cuts measured on the 1. Beamtime on Bi2223. Only one crystal was measured on this beamtime. The data was taken at Low Temperature (around 11K) and High Temp (around 127K). Additionally to the EDC cuts of Bi2223, cuts of polycrystalline Gold foil were measured to have an accurate presentation of the Fermi Level. These cuts are also displayed here.

1.1 EDCs of Bi2223 at High and Low Temp

```
[2]: # Define directory  
path = os.path.abspath("G:\My Drive\Bi2223\e19557\Box_1_square_renamed")  
  
# 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)

# 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, 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]: 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

```

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[3]: ['G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_AN_P2p5_25eV_UNKN_LT_10eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_AN_P2p5_25eV_CIRCP_LT_10eVpass_0001.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_AN_P2p5_25eV_CIRCP_LT_10eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_N_M40_26p5eV_CIRCP_LT_5eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_AN_P95_25eV_LHQ_LT_5eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_AN_P95_25eV_CIRCP_HT_10eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_AN_P5_25eV_CIRCP_HT_10eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_N_P50_52eV_LVLE_LT_10eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_N_P50_52eV_LHQ_LT_10eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_N_P50_26p5eV_LHQ_LT_5eVpass_0000.h5', 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_N_P50_26p5eV_CIRCP_LT_5eVpass_0000.h5']

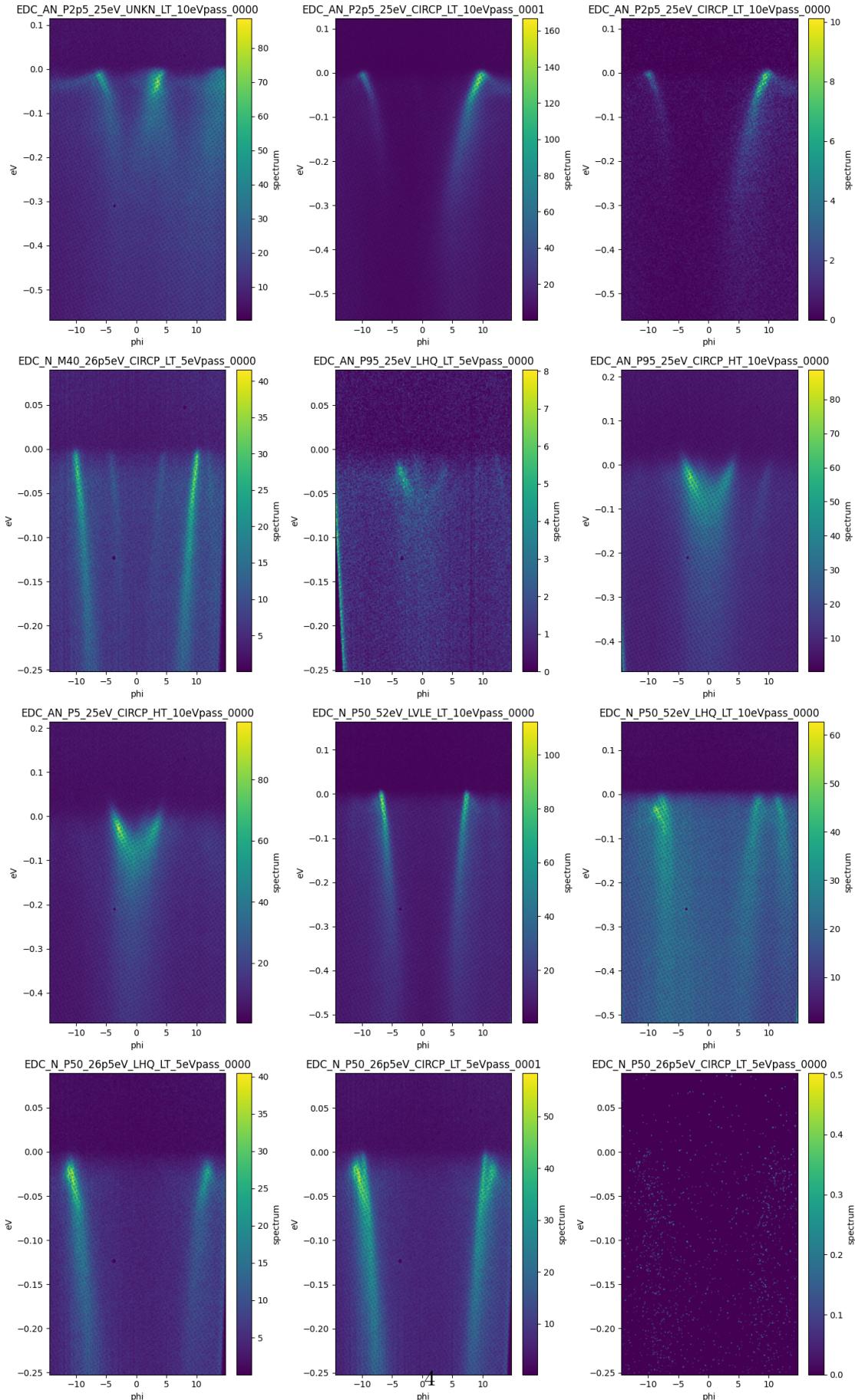
```
5eVpass_0001.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_N_P50_26p5eV_CIRCP_LT_
5eVpass_0000.h5']
```

```
[4]: 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]: 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])
```



1.2 EDC cuts of Au at Low Temperature

```
[6]: # Define directory
path = os.path.abspath("G:\My Drive\Bi2223\e19557\Box_1_square_renamed")

# Different parameters used to set up scans at SLS
scan_type = 'EDC'
direction = '*'
phi = '*'
energy = '*'
polarization = '*'
temp = '*'
e_pass = '*'+'eVpass'
comment = 'GoldRef11K'
run = '*' .zfill(4)

# Put together string for finding file
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_GoldRef11K_000*.h5'

```
[7]: 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
```

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```
[7]: ['G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_26p5eV_UNKN_LT_5
eVpass_GoldRef11K_0002.h5',
 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_26p5eV_UNKN_LT_5
eVpass_GoldRef11K_0001.h5',
 'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_26p5eV_UNKN_LT_5
eVpass_GoldRef11K_0000.h5',
```

```

'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_26p5eV_UNKN_LT_2
0eVpass_GoldRef11K_0000.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0007.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0006.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0005.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0004.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0003.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0002.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0001.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_UNKN_LT_5eV
pass_GoldRef11K_0000.h5',
'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_52eV_CIRCP_LT_5e
Vpass_GoldRef11K_0000.h5']

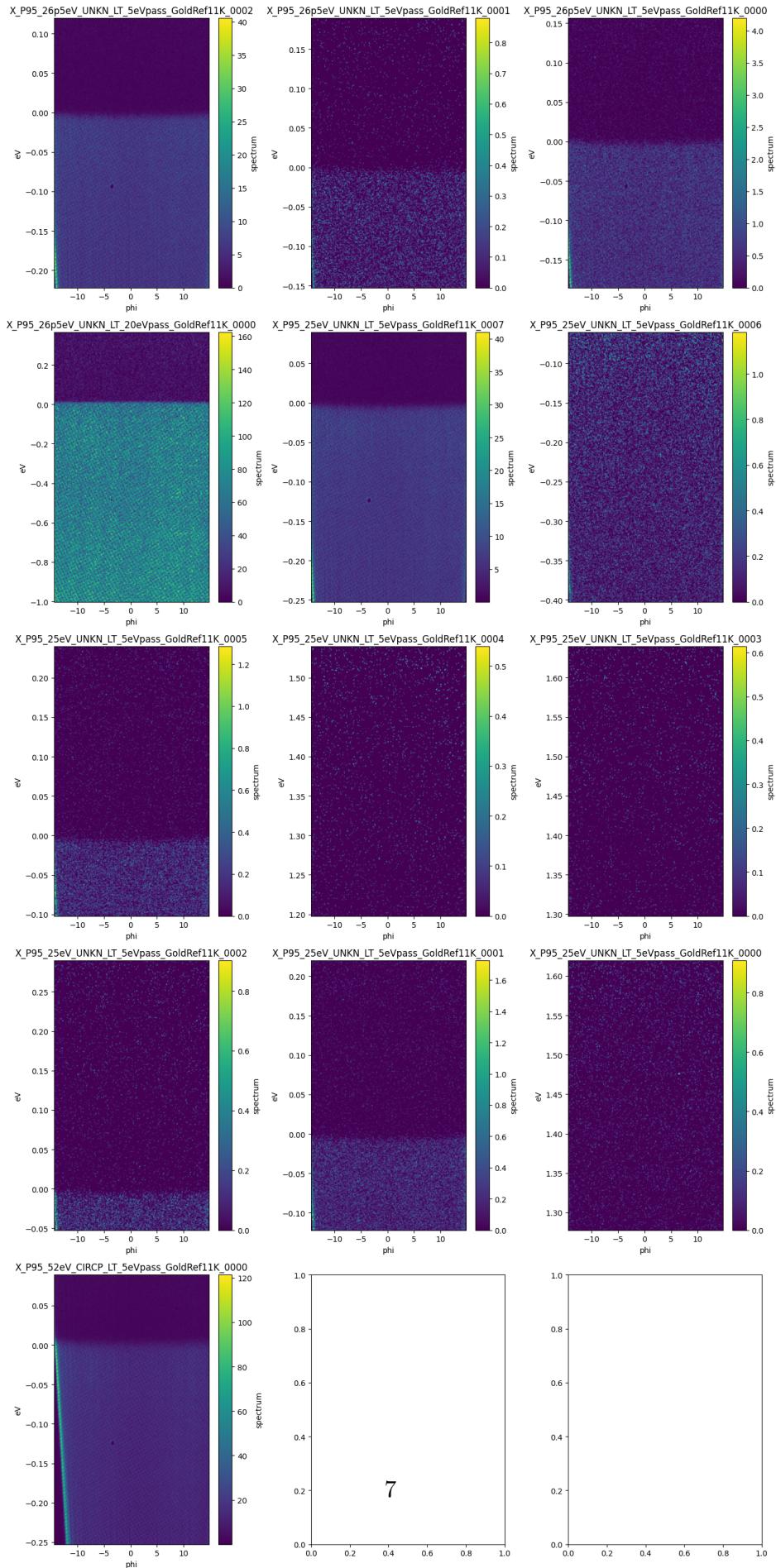
```

```
[8]: 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]: 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}".
        replace("EDC_", ''))

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



1.3 EDC cuts of Au at High Temperature

```
[10]: # Define directory
path = os.path.abspath("G:\My Drive\Bi2223\e19557\Box_1_square_renamed")

# Different parameters used to set up scans at SLS
scan_type = 'EDC'
direction = '*'
phi = '*'
energy = '*'
polarization = '*'
temp = '*'
e_pass = '*'+'eVpass'
comment = 'GoldRef127K'
run = '*' .zfill(4)

# Put together string for finding file
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_*_*_*_*_*eVpass_GoldRef127K_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
```

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```
[11]: ['G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_26p5eV_CIRCP_HT_5eVpass_GoldRef127K_0000.h5',
      'G:\\My Drive\\Bi2223\\e19557\\Box_1_square_renamed\\EDC_X_P95_25eV_CIRCP_HT_5eVpass_GoldRef127K_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}\"".
        replace("EDC_",""))

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

