44-44-44-64-6-beta-10.85-twist-2

October 16, 2024

[23]:
```
%load_ext autoreload
%autoreload 2
from modules import read_and_write
from modules import polyakov
from modules import utility
from modules import fourier_surface
from IPython.display import Markdown, display
```

```
The autoreload extension is already loaded. To reload it, use:
  %reload_ext autoreload
```

1 Load data

[19]:
```
folder_names = ["../data/output-measure-surface/su4-36-36-48-6",
                "../data/output-measure-surface/su4-44-44-64-6/beta-12-twist-2",
                "../data/output-measure-surface/su4-44-44-64-6/beta-10.
 ↪9-twist-2",
                "../data/output-measure-surface/su4-44-44-64-6/beta-10.
 ↪85-twist-1",
                "../data/output-measure-surface/su4-44-44-64-6/beta-10.
 ↪85-twist-2"]
choose_folder = 5
fourier_profiles = []
smearing_levels = [5,10,15,30]
for i in smearing_levels:
    volume, fourier_profile = read_and_write.
 ↪read_surface_data(folder_names[choose_folder-1], f"fourier_profile_{i}")
    fourier_profiles.append(fourier_profile)
```

[63]:
```
title_info = folder_names[choose_folder-1].split( '/')
group = title_info[3].split('-')[0][2]
temp = title_info[4].split('-')[1]
twist_coeff = title_info[4].split('-')[3]
title_markdown = r"# $\text{{SU}}({})$, $V$ = {}, $\beta=$ {}, twist coeff $=$␣
 ↪{}".format(group, volume, temp, twist_coeff)
display(Markdown(title_markdown))
```

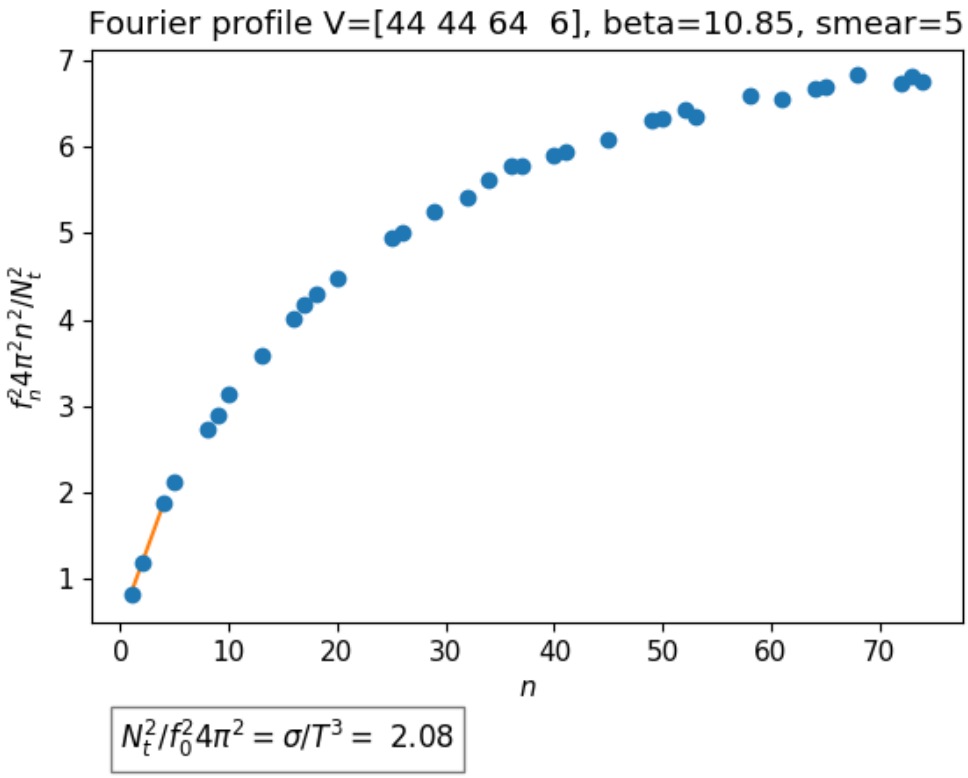
2 SU(4), $V = [44\ 44\ 64\ 6]$, $\beta = 10.85$, twist coeff = 2

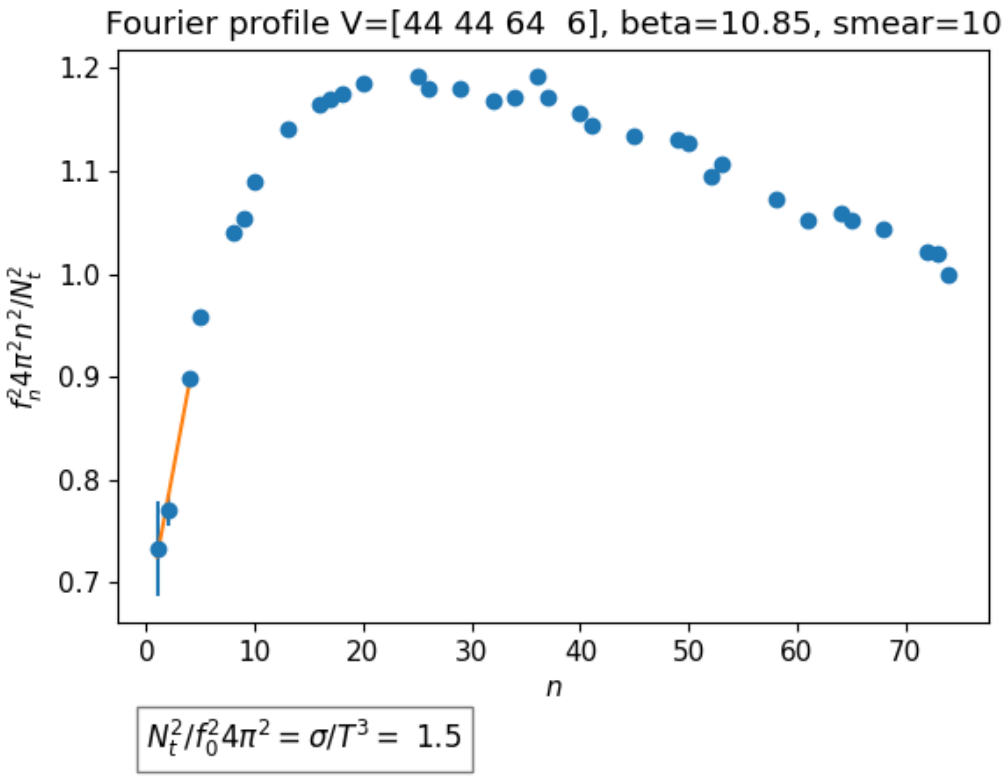
2.1 Perform post processing

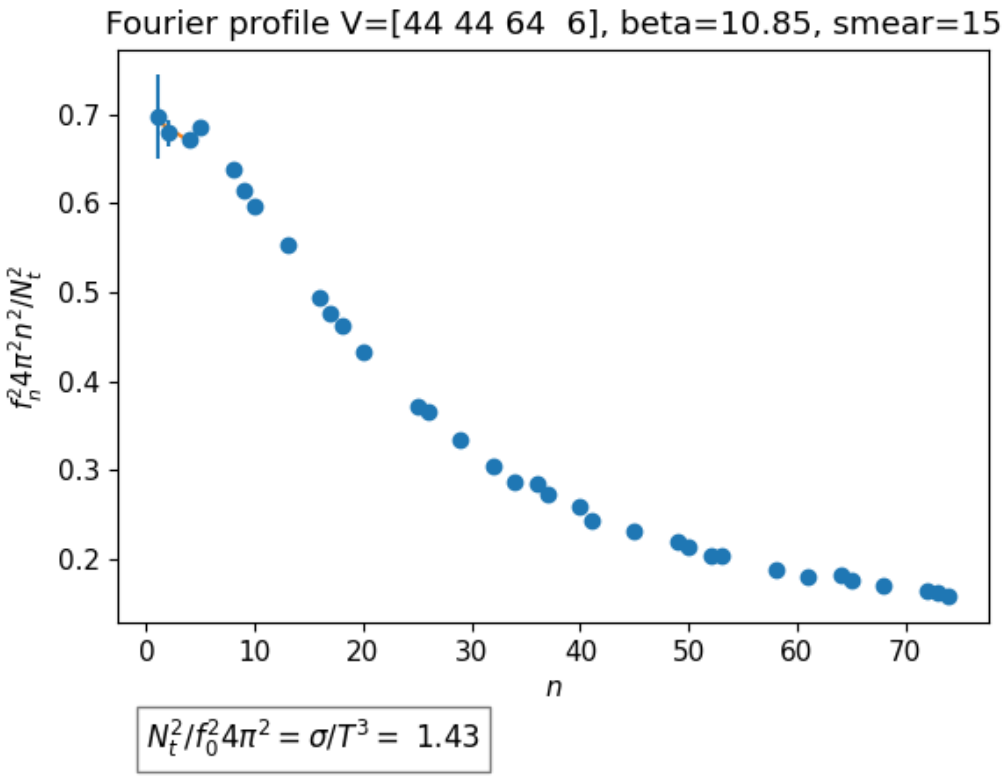
[20]:
```
n_2_list = []
f_n_list = []
errors_list = []
for profile in fourier_profiles:
    n_2, f_n, errors= utility.compute_with_aa_jackknife_fourier(profile,␣
 ↪10,thermalization=100)
    n_2_list.append(n_2)
    f_n_list.append(f_n)
    errors_list.append(errors)
```

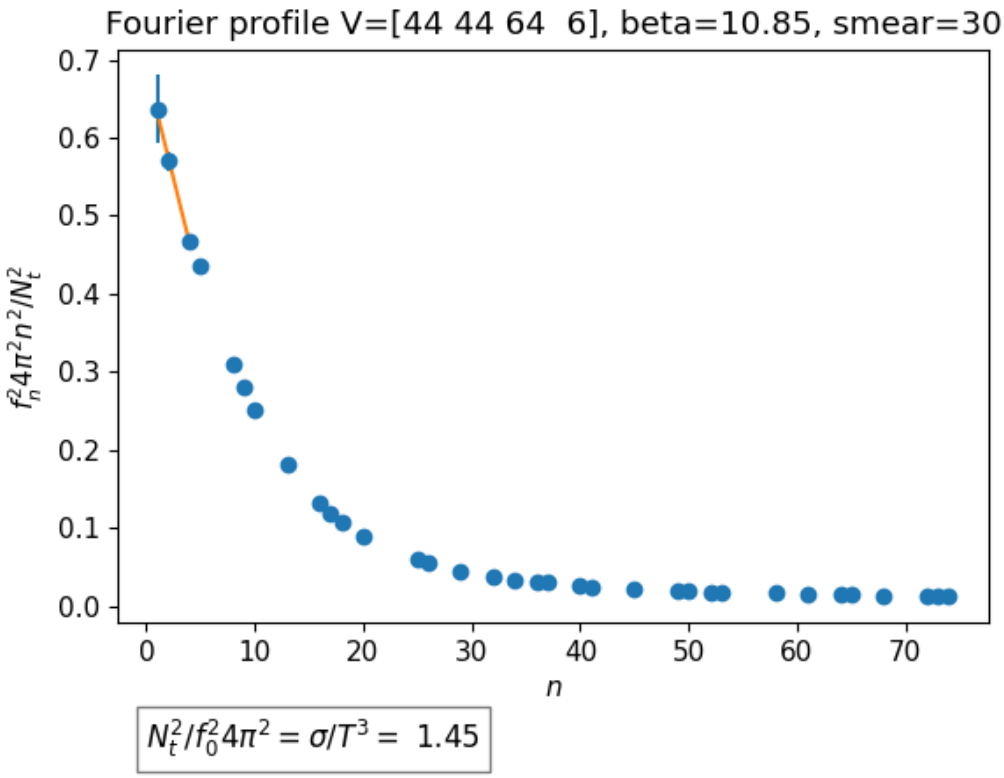
2.2 Plot Fourier modes for different smearing steps

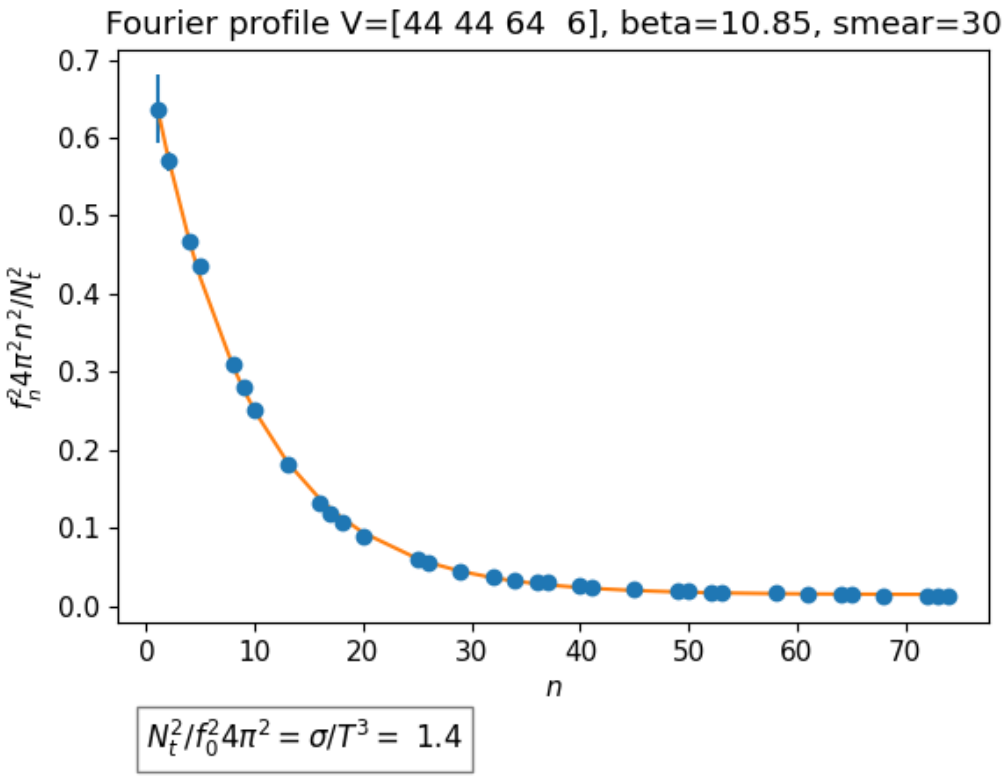
[21]:
```
smearing = [5,10,15,30]
%matplotlib widget
for n_2,f_n,error,smear in zip(n_2_list,f_n_list,errors_list,smearing):
    fourier_surface.plot_fourier_profile(n_2,f_n,volume,errors=error,beta=10.
 ↪85, fit_range=3, smearing=smear)
fourier_surface.
 ↪plot_fourier_profile_exponential_fit(n_2,f_n,volume,errors=error,beta=10.85,␣
 ↪fit_range=5, smearing=smear)
```


Fourier profile V=[44 44 64 6], beta=10.85, smear=5
$f_n^2 4\pi^2 n^2/N_t^2$
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 2.08


Fourier profile V=[44 44 64 6], beta=10.85, smear=10
$f_n^2 4\pi^2 n^2/N_t^2$
1.2
1.1
1.0
0.9
0.8
0.7
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.5


Fourier profile V=[44 44 64 6], beta=10.85, smear=15
$f_n^2 4\pi^2 n^2/N_t^2$
0.7
0.6
0.5
0.4
0.3
0.2
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.43


Fourier profile V=[44 44 64 6], beta=10.85, smear=30
$f_n^2 4\pi^2 n^2/N_t^2$
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.45


Fourier profile V=[44 44 64 6], beta=10.85, smear=30
$f_n^2 4\pi^2 n^2/N_t^2$
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.4

[ ]: