44-44-44-64-6-beta-10.85-twist-1

October 16, 2024

[80]:
```
%load_ext autoreload
%autoreload 2
from modules import read_and_write
from modules import polyakov
from modules import utility
from modules import fourier_surface
import os
import glob
```

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

1 Load data

[94]:
```
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 = 4
fourier_profiles = {}
folder = folder_names[choose_folder-1]
files = glob.glob(os.path.join(folder, "fourier_profile_*"))
for file in files:
    file_name = file.split("/")[-1]
    smearing_level = file_name.split("_")[-1]
    volume, fourier_profile = read_and_write.read_surface_data(folder,␣
 ↪file_name)
    fourier_profiles[smearing_level] = fourier_profile
fourier_profiles = dict(sorted(fourier_profiles.items(), key=lambda item:␣
 ↪int(item[0])))
```

[95]:
```
utility.display_markdown_title(folder_names[choose_folder-1])
```

2 SU(4), V = ['44', '44', '64', '6'], β = 10.85, twist coeff = 1

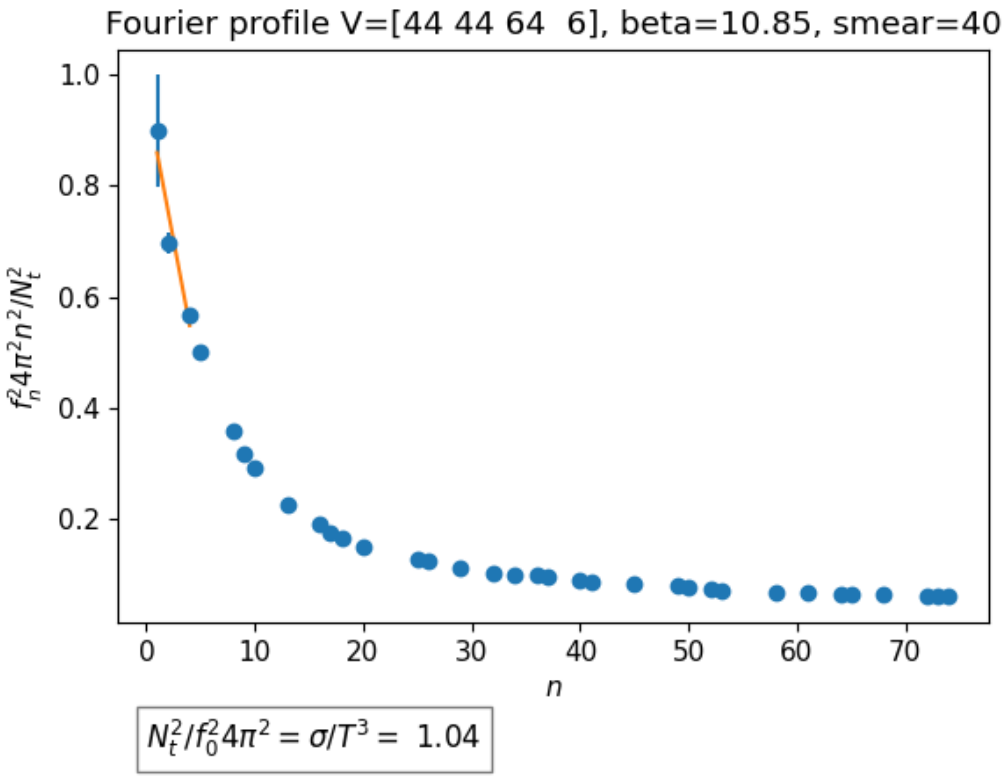
2.1 Perform post processing

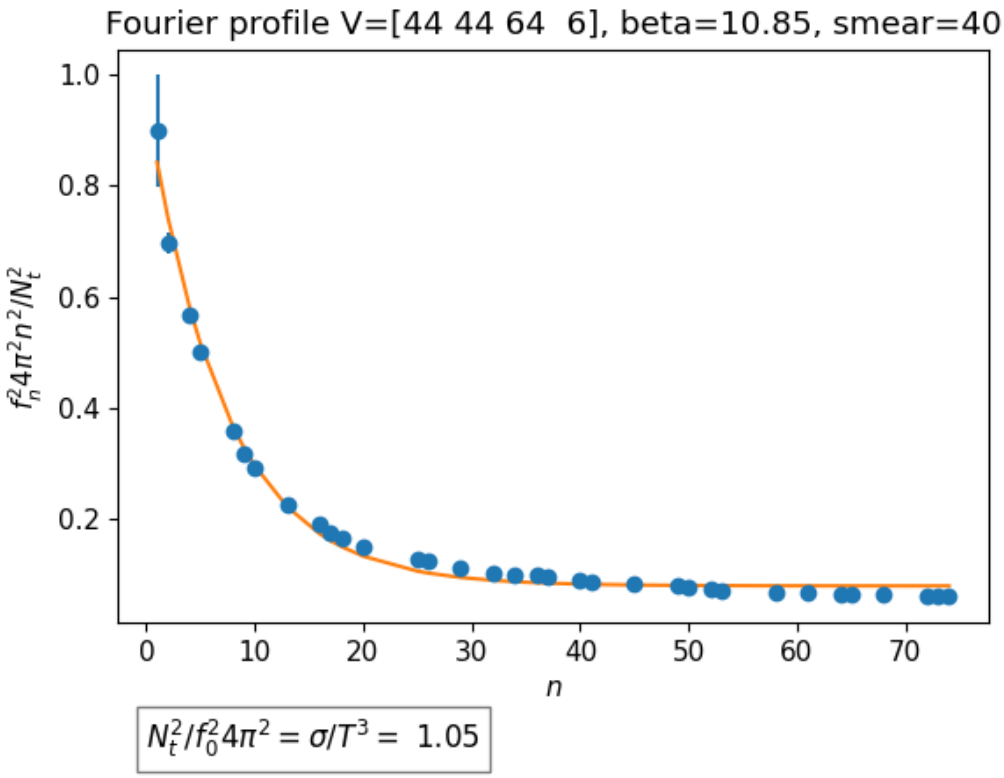
[96]:
```
n_2_list = []
f_n_list = []
errors_list = []
for smearing_level, profile in fourier_profiles.items():
    n_2, f_n, errors = utility.compute_with_aa_jackknife_fourier(profile, 10,␣
 ↪thermalization=100)
    n_2_list.append(n_2)
    f_n_list.append(f_n)
    errors_list.append(errors)
```

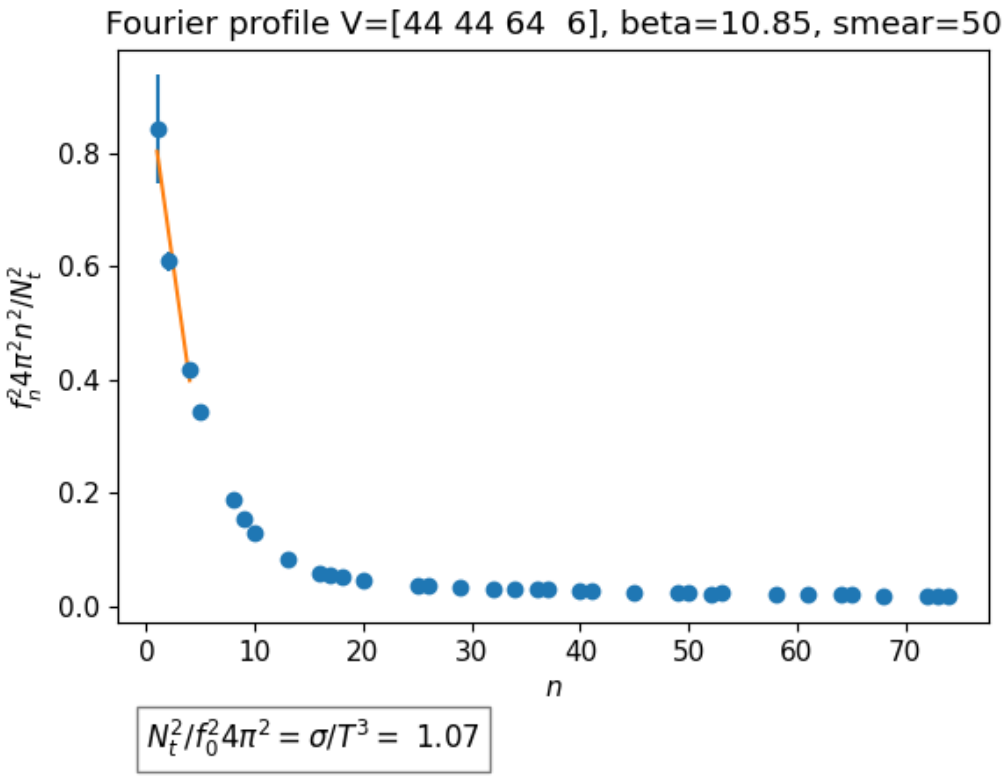
```
40
50
70
100
```

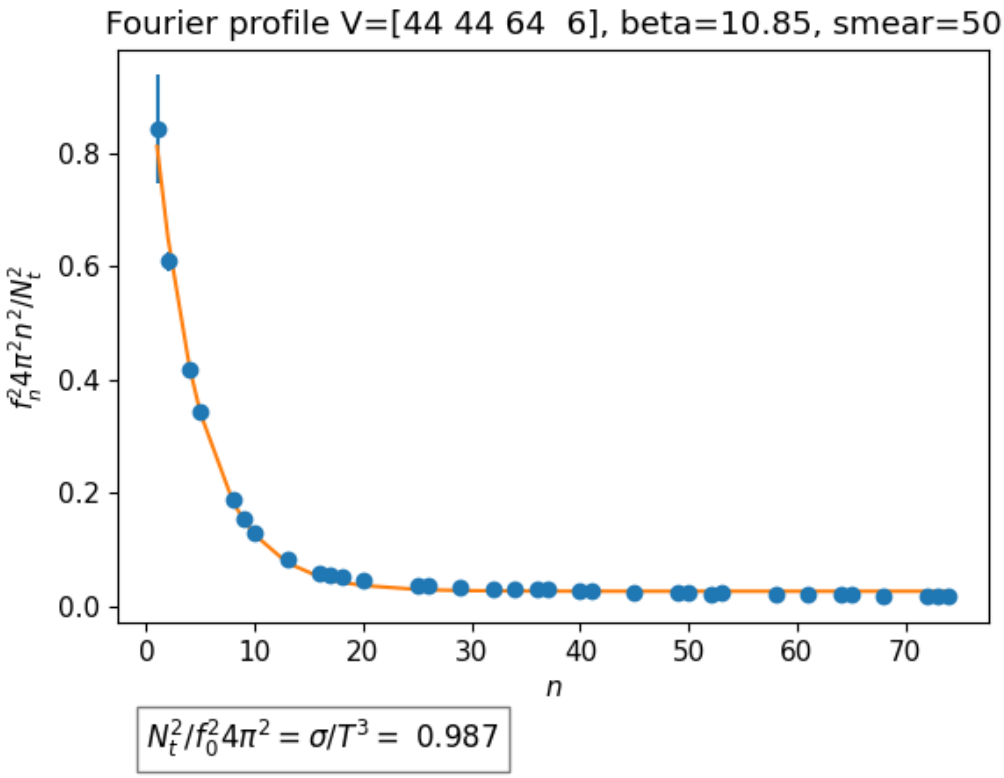
2.2 Plot Fourier modes for different smearing steps

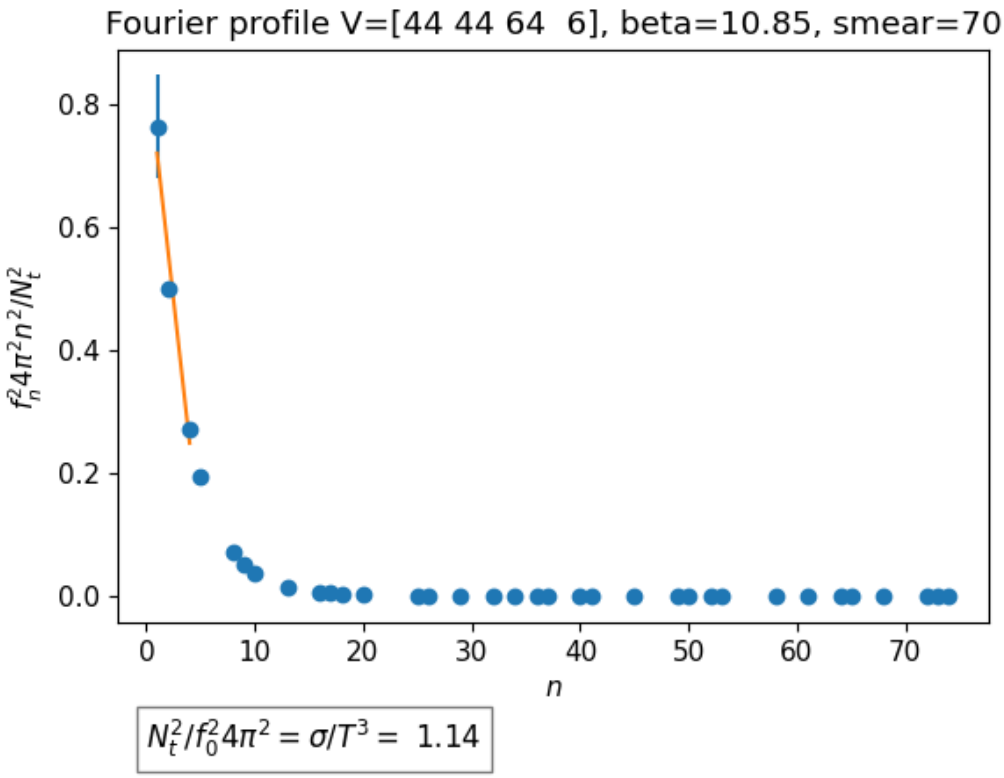
[98]:
```
%matplotlib widget
smearing_levels = list(fourier_profiles.keys())
for n_2,f_n,error,smear in zip(n_2_list,f_n_list,errors_list,smearing_levels):
    fourier_surface.plot_fourier_profile(n_2,f_n,volume,errors=error,beta=10.
 ↪85, fit_range=3, smearing=smear)
    fourier_surface.
 ↪plot_fourier_profile_exponential_fit(n_2,f_n,volume,errors=error,beta=10.85,␣
 ↪fit_range=5, smearing=smear)
```

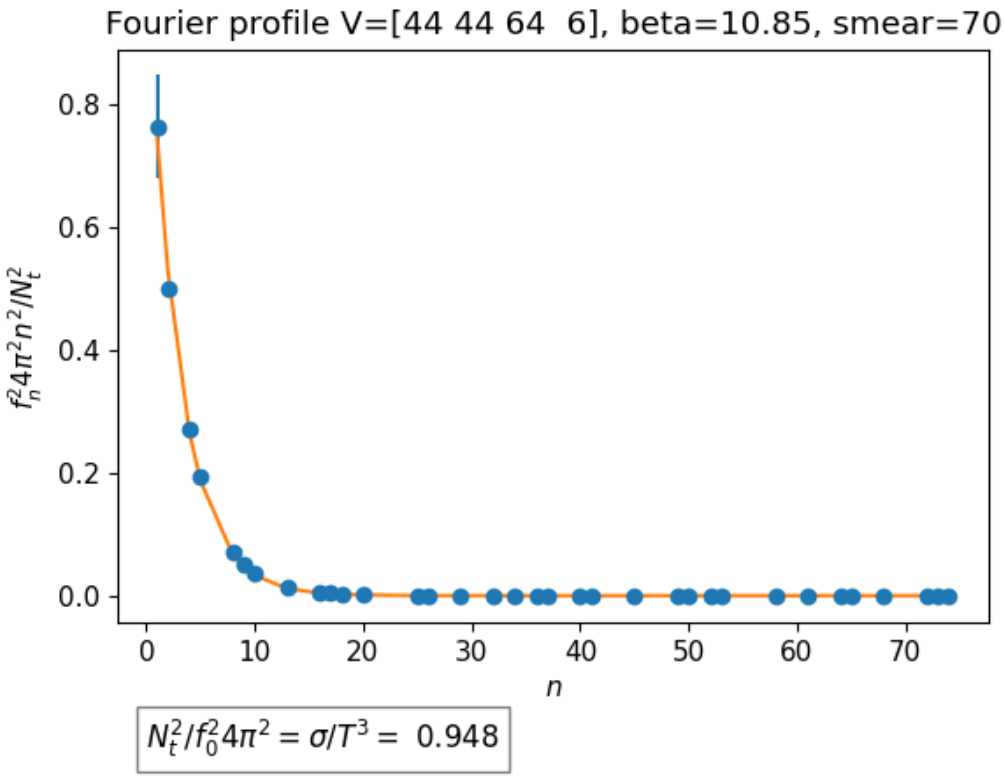

Fourier profile V=[44 44 64 6], beta=10.85, smear=40
$f_n^2 4\pi^2 n^2/N_t^2$
1.0
0.8
0.6
0.4
0.2
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.04

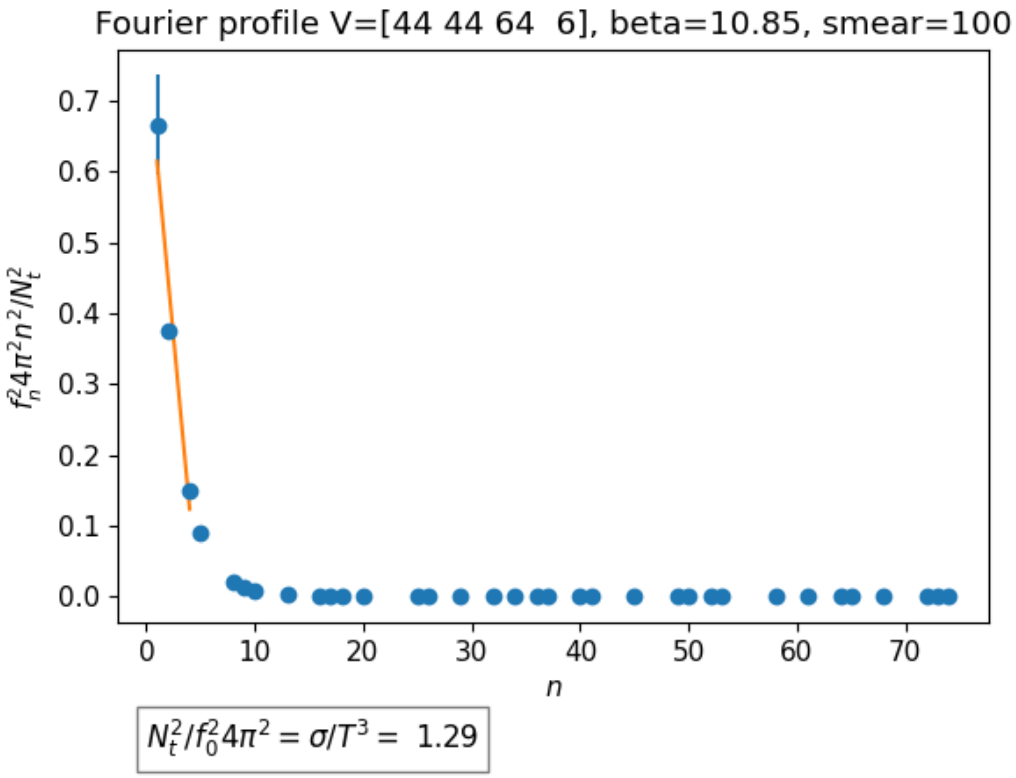

Fourier profile V=[44 44 64 6], beta=10.85, smear=40
$f_n^2 4\pi^2 n^2/N_t^2$
1.0
0.8
0.6
0.4
0.2
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.05

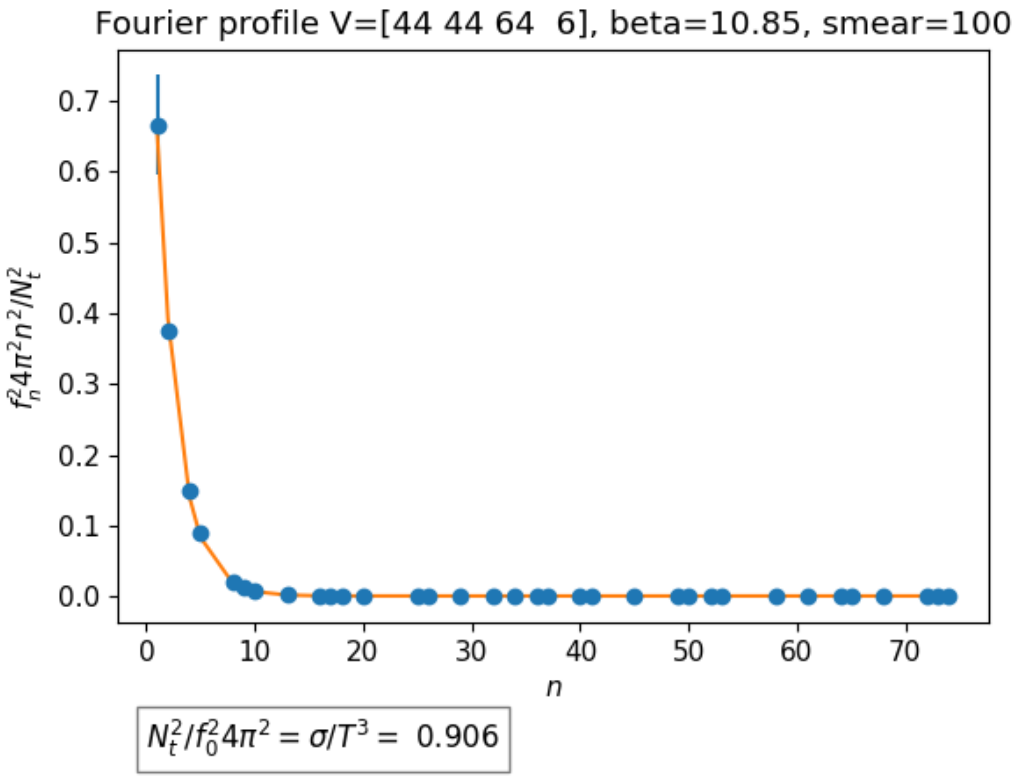

Fourier profile V=[44 44 64 6], beta=10.85, smear=50
$f_n^2 4\pi^2 n^2/N_t^2$
0.0
0.2
0.4
0.6
0.8
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.07


Fourier profile V=[44 44 64 6], beta=10.85, smear=50
$f_n^2 4\pi^2 n^2/N_t^2$
0.0
0.2
0.4
0.6
0.8
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 0.987


Fourier profile V=[44 44 64 6], beta=10.85, smear=70
$f_n^2 4\pi^2 n^2/N_t^2$
0.0
0.2
0.4
0.6
0.8
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.14


Fourier profile V=[44 44 64 6], beta=10.85, smear=70
$f_n^2 4\pi^2 n^2/N_t^2$
0.0
0.2
0.4
0.6
0.8
0
10
20
30
40
50
60
70
n
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 0.948


Fourier profile V=[44 44 64 6], beta=10.85, smear=100
$f_n^2 4\pi^2 n^2/N_t^2$
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
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 1.29


Fourier profile V=[44 44 64 6], beta=10.85, smear=100
$f_n^2 4\pi^2 n^2/N_t^2$
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
$N_t^2/f_0^2 4\pi^2 = \sigma/T^3 =$ 0.906

[ ]: