

AUGNLED MEGA off-axis nonlinear simulations

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It would be nice to have the Energetic particles density profiles at various times, at, e.g.:

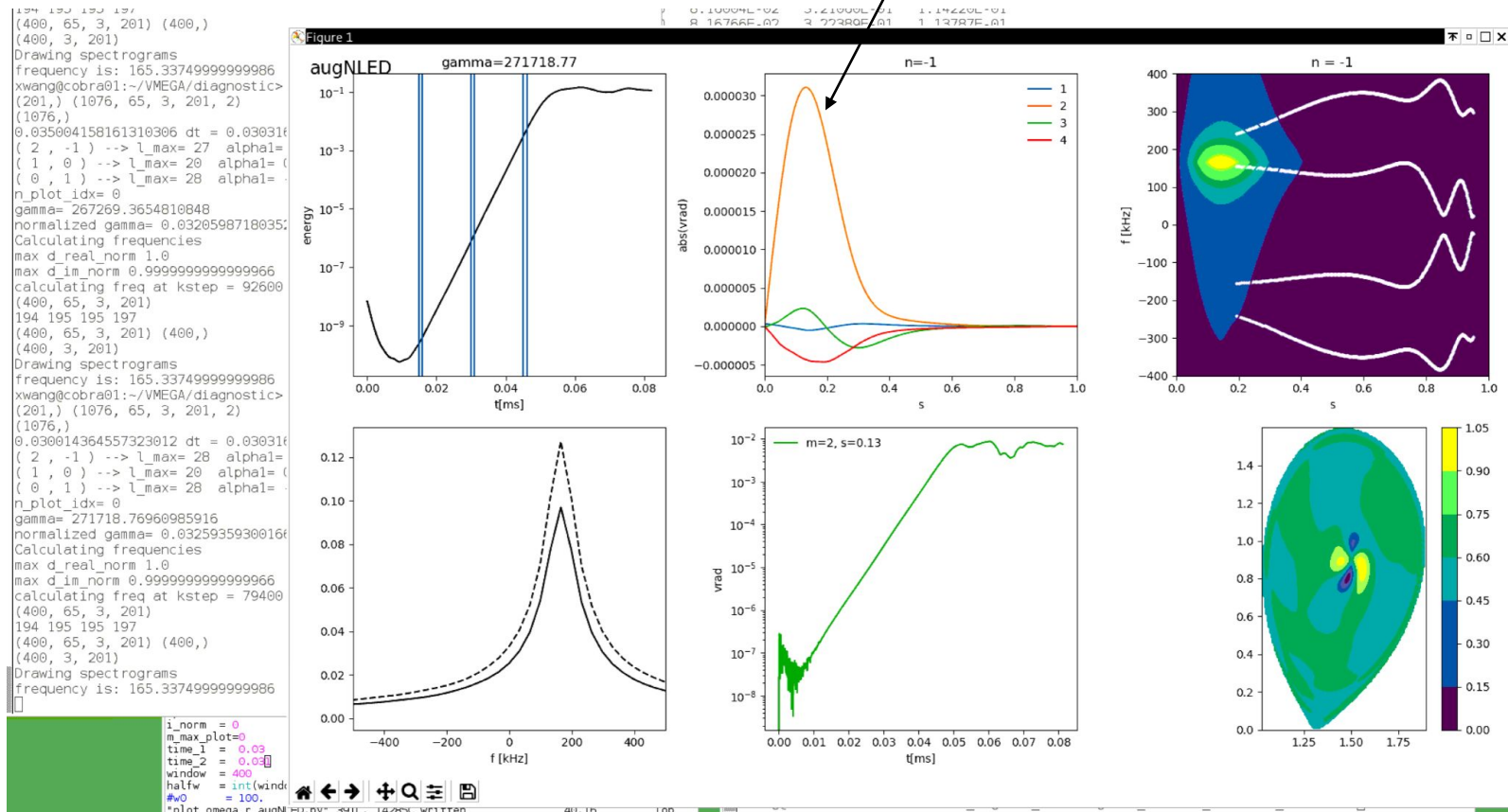
- during linear phase,
- begin of saturation,
- early saturation,
- long after saturation...

FOW simulations

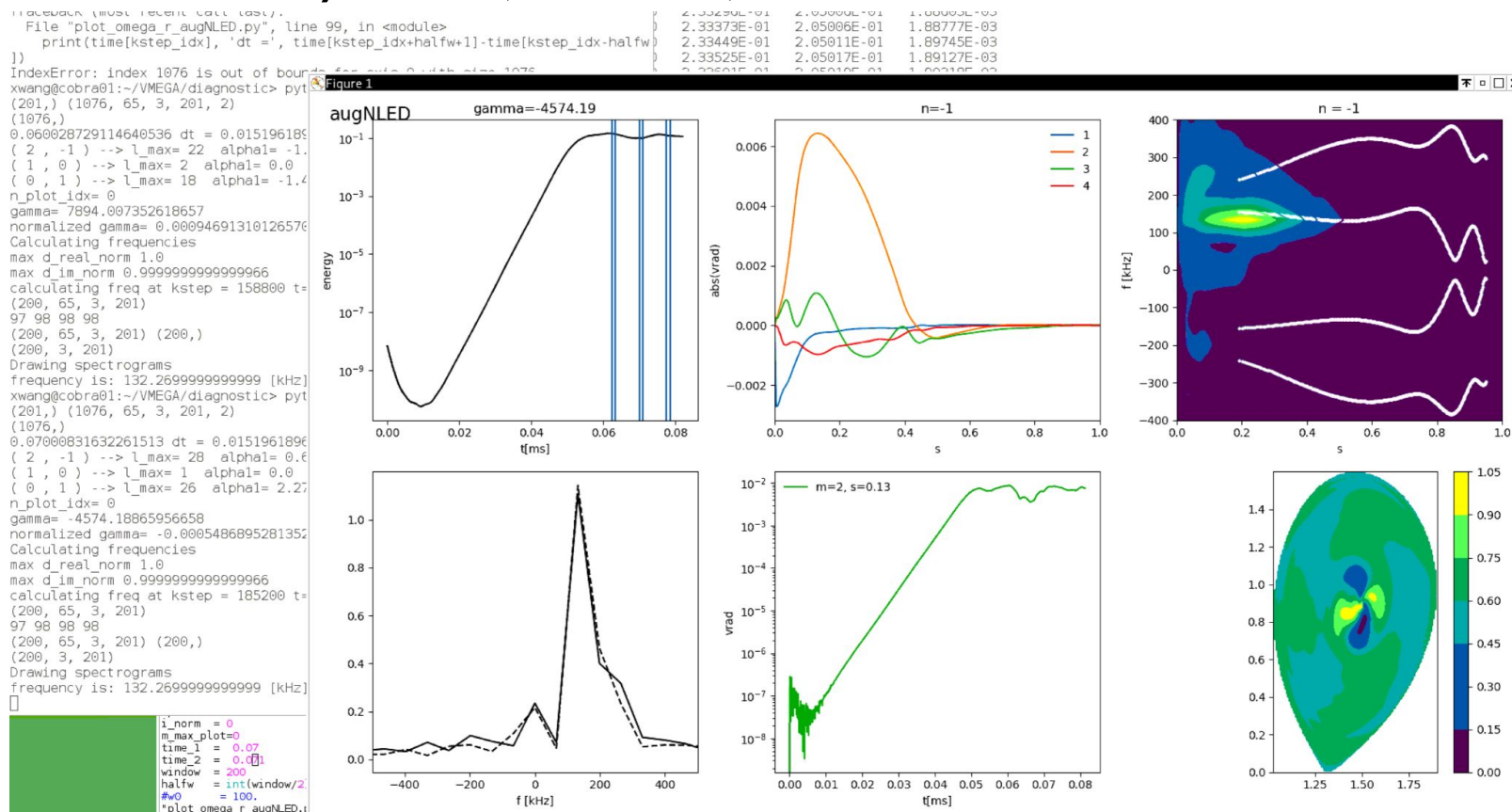
- scan on Energetic Particle beta (density)

FLR possible (?)

phi(m,n;s) instead of vrad, as for the 2021 paper

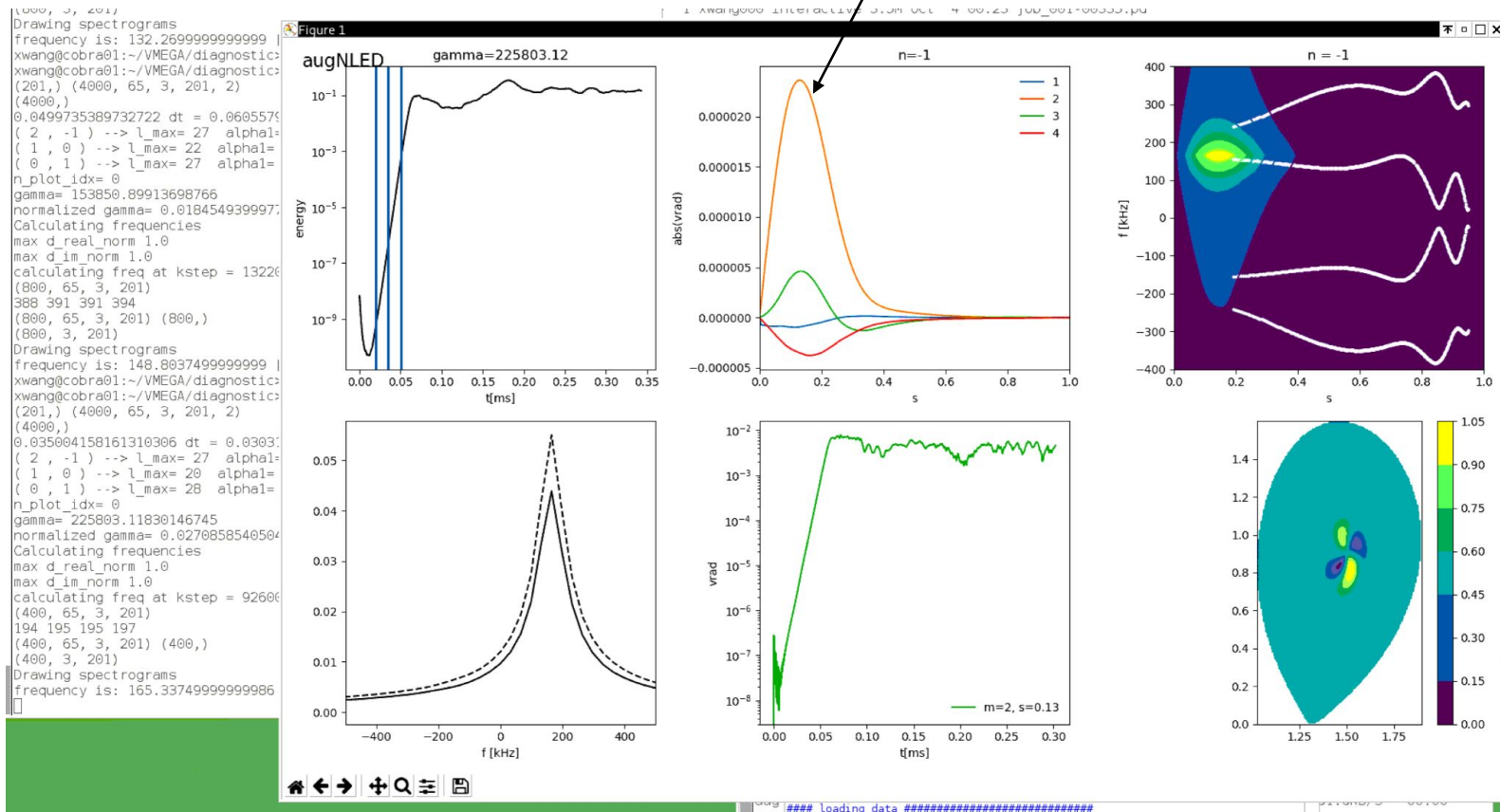


Off-axis: density scan (1.2beta) 1



Off-axis: density scan (standard)

$\phi(m,n;s)$ instead of vrad, as for the 2021 paper



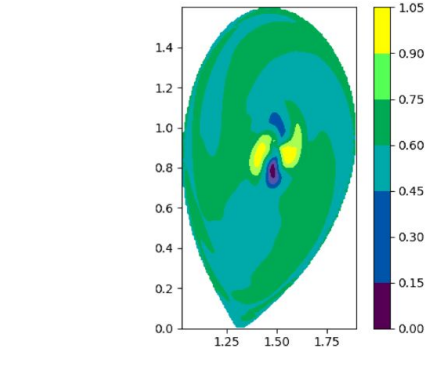
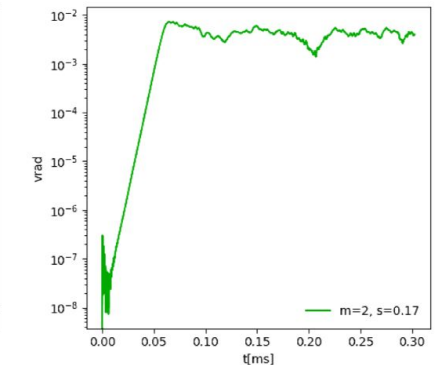
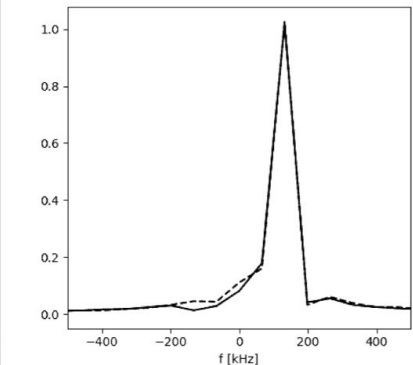
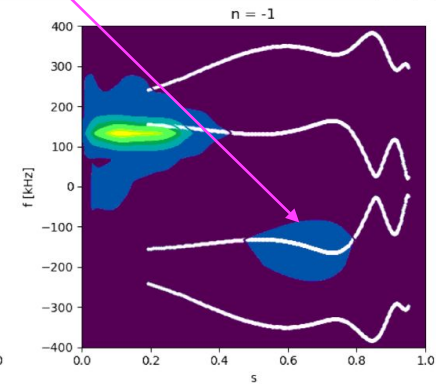
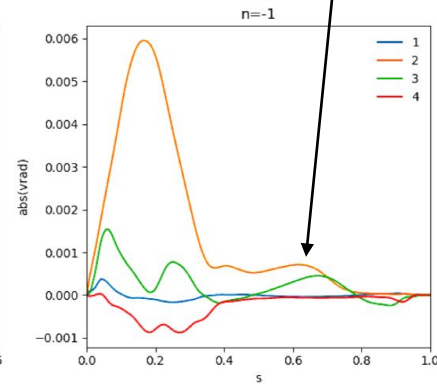
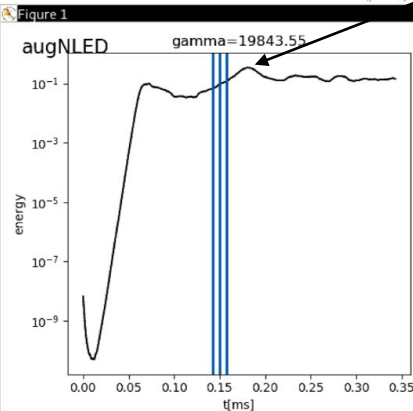
Off-axis: density scan (standard) 1

Secondary mode growing at the edge?

```
File "plot_omega_r_augNLED.py", line 11
    pwd = "/u/xwang/data/marconi_augnled_2021/augnled_onaxis_standard/"
```

```
IndentationError: unexpected indent
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (5201, 65, 3, 201, 2)
(5201,)
0.14999621985484962 dt = 0.0151961896
(2, -1) --> l_max= 81 alpha1= -0.
(1, 0) --> l_max= 74 alpha1= 0.0
(0, 1) --> l_max= 81 alpha1= -2.7
n_plot_idx= 0
gamma= 24862.97966234873
normalized gamma= 0.00298239919563426
Calculating frequencies
max d_real_norm 1.0
max d_im_norm 0.9999999999999996
calculating freq at kstep = 396800 t=
(200, 65, 3, 201) (200,)
(200, 3, 201)
Drawing spectrograms
frequency is: -132.26999999999999 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (4000, 65, 3, 201, 2)
(4000,)
0.14999621985484962 dt = 0.0151961896
(2, -1) --> l_max= 35 alpha1= -0.
(1, 0) --> l_max= 1 alpha1= 0.0
(0, 1) --> l_max= 35 alpha1= -2.5
n_plot_idx= 0
gamma= 19843.552322510903
normalized gamma= 0.00238030176949405
Calculating frequencies
max d_real_norm 1.0
max d_im_norm 1.0
calculating freq at kstep = 396800 t=
(200, 65, 3, 201)
(200, 3, 201)
Drawing spectrograms
frequency is: 132.26999999999999 [kHz]
```

```
i_norm = 0
m_max_plot=0
time_1 = 0.15
time_2 = 0.151
window = 200
halfw = int(window/2)
#p0 = 100.
#plot omega_r augnLED
```



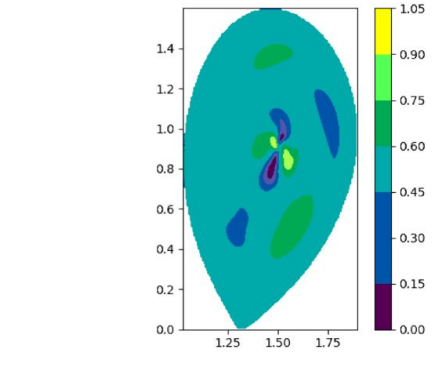
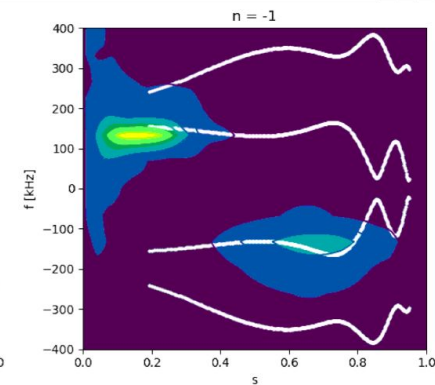
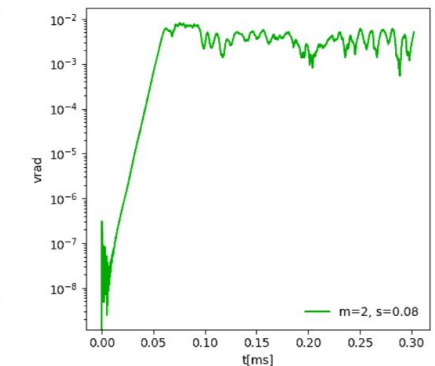
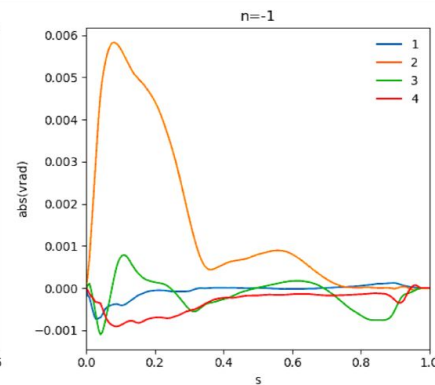
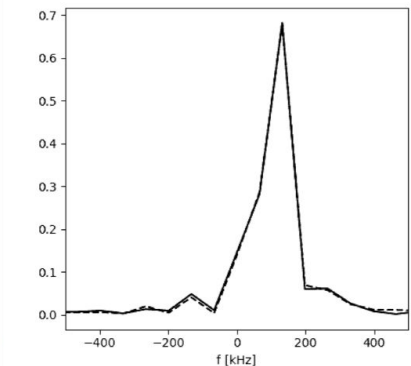
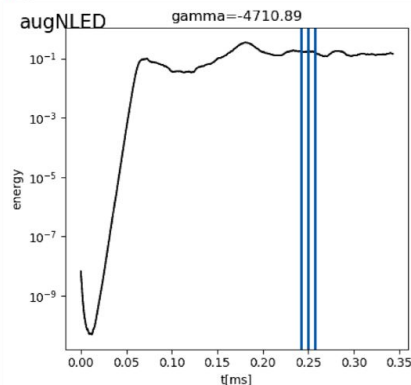
Off-axis: density scan (standard) 2

```

(200, 65, 3, 201) (200,)
(200, 3, 201)
Drawing spectrograms
frequency is: -132.26999999999999 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (4000, 65, 3, 201, 2)
(4000,)
0.14999621985484962 dt = 0.01519618961
( 2, -1) --> l_max= 35 alpha=-0.0
( 1, 0) --> l_max= 1 alpha=0.0
( 0, 1) --> l_max= 35 alpha=-2.5
n_plot_idx= 0
gamma= 19843.552322510903
normalized gamma= 0.00238030176949402
Calculating frequencies
max_d_real_norm 1.0
max_d_im_norm 1.0
calculating freq at kstep= 396800 t=
(200, 65, 3, 201)
97 98 98 98
(200, 65, 3, 201) (200,)
(200, 3, 201)
Drawing spectrograms
frequency is: 132.26999999999999 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (4000, 65, 3, 201, 2)
(4000,)
0.250018900737051 dt = 0.01519618961
( 2, -1) --> l_max= 17 alpha=-0.0
( 1, 0) --> l_max= 1 alpha=0.0
( 0, 1) --> l_max= 18 alpha=-2.5
n_plot_idx= 0
gamma= -4710.886844340623
normalized gamma= -0.0005650869415527
Calculating frequencies
max_d_real_norm 1.0
max_d_im_norm 1.0
calculating freq at kstep= 661400 t=
(200, 65, 3, 201)
97 98 98 98
(200, 65, 3, 201) (200,)
(200, 3, 201)
Drawing spectrograms
frequency is: 132.26999999999999 [kHz]

```

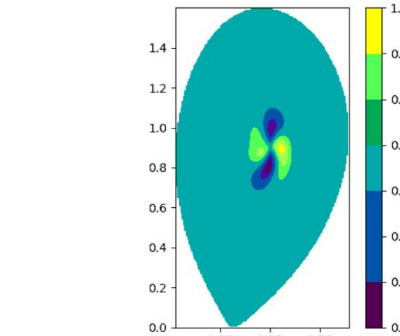
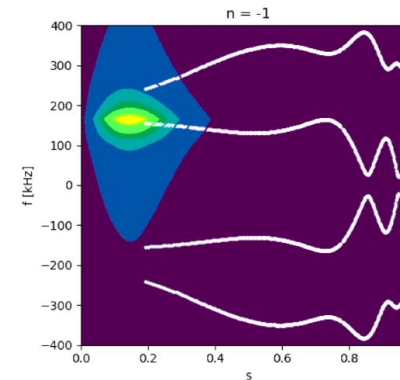
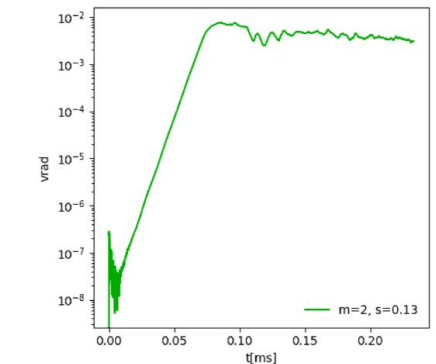
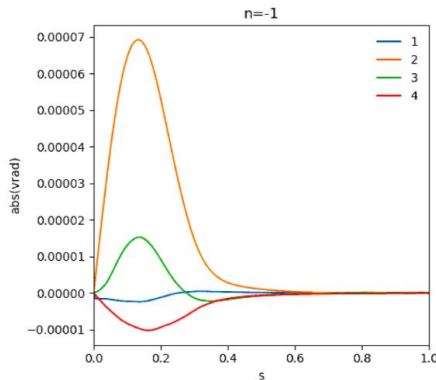
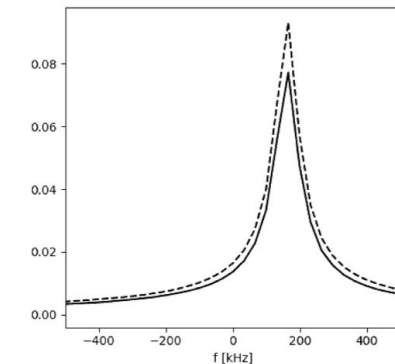
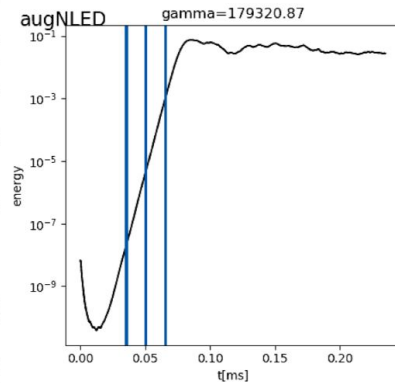
Figure 1



```

(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 165.337499999999986 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (3086, 65, 3, 201, 2)
(3086,)
0.03001436455732012 dt = 0.0303167762
( 2 , -1 ) --> l_max= 28 alpha1= -.0
( 1 , 0 ) --> l_max= 23 alpha1= 0.0
( 0 , 1 ) --> l_max= 28 alpha1= -2.6
n_plot_idx=0
gamma= 160604.78281713766
normalized gamma= 0.01925509137655586
Calculating frequencies
max d_real norm 1.0
max d_m norm 0.99999999999999992
calculating freq at kstep = 79400 t=
(400, 65, 3, 201)
194 195 195 197
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 165.337499999999986 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (3086, 65, 3, 201, 2)
(3086,)
0.0499735389732722 dt = 0.03031677625
( 2 , -1 ) --> l_max= 28 alpha1= -.0
( 1 , 0 ) --> l_max= 21 alpha1= 0.0
( 0 , 1 ) --> l_max= 28 alpha1= 2.95
n_plot_idx=0
gamma= 179320.87065140734
normalized gamma= 0.02151014993593376
Calculating frequencies
max d_real norm 1.0
max d_m norm 0.99999999999999992
calculating freq at kstep = 132200 t=
(400, 65, 3, 201)
194 195 195 197
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 165.337499999999986 [kHz]

```



Off-axis: density scan (0.8beta) 1

```

xwang@cobra01:~/VMEGA/diagnostic> python3 plot_omega_r_augNLED.py
File "plot_omega_r_augNLED.py", line 11
    pwd = '/u/xwang/data/marconi_augnled_2021/augnled_onaxis_standard/'
    ^
IndentationError: unexpected indent

```

```

xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (5201, 65, 3, 201, 2)
(5201,)
0.14999621985484962 dt = 0.0151961896
( 2, -1) --> l_max= 81 alpha1= -0.0
( 1, 0) --> l_max= 74 alpha1= 0.0
( 0, 1) --> l_max= 81 alpha1= -2.7
n_plot_idx= 0
gamma= 24862.97966234873
normalized gamma= 0.00298239919563426
Calculating frequencies
max_d_real_norm 1.0
max_d_im_norm 0.9999999999999999
calculating freq at kstep = 396800 t=
(200, 65, 3, 201)
97 98 98 98
(200, 65, 3, 201) (200,)
(200, 3, 201)
Drawing spectrograms
frequency is: -132.26999999999999 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (4000, 65, 3, 201, 2)
(4000,)
0.14999621985484962 dt = 0.0151961896
( 2, -1) --> l_max= 35 alpha1= -0.0
( 1, 0) --> l_max= 1 alpha1= 0.0
( 0, 1) --> l_max= 35 alpha1= -2.9
n_plot_idx= 0
gamma= 19843.552322510903
normalized gamma= 0.00238030176949403
Calculating frequencies
max_d_real_norm 1.0
max_d_im_norm 1.0
calculating freq at kstep = 396800 t=
(200, 65, 3, 201)
97 98 98 98
(200, 65, 3, 201) (200,)
(200, 3, 201)
Drawing spectrograms
frequency is: 132.26999999999999 [kHz]

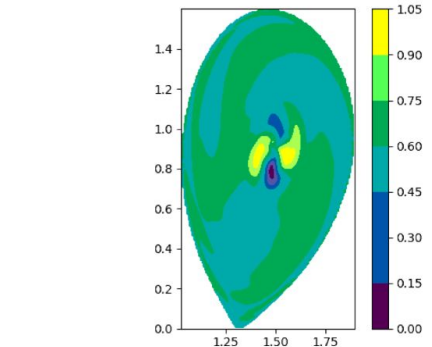
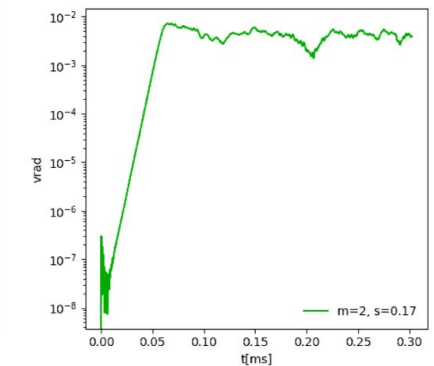
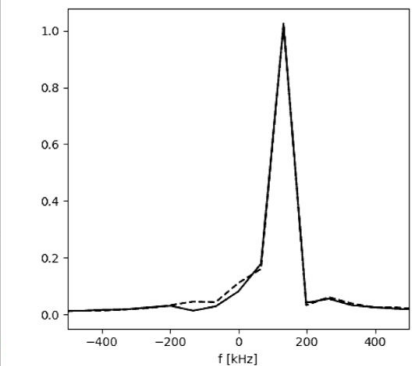
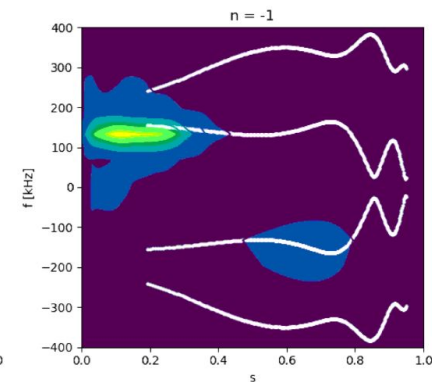
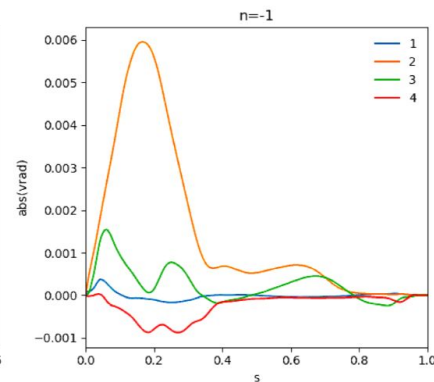
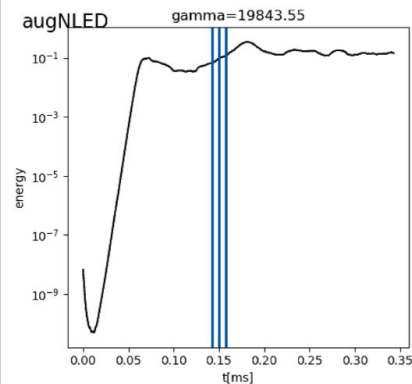
```

```

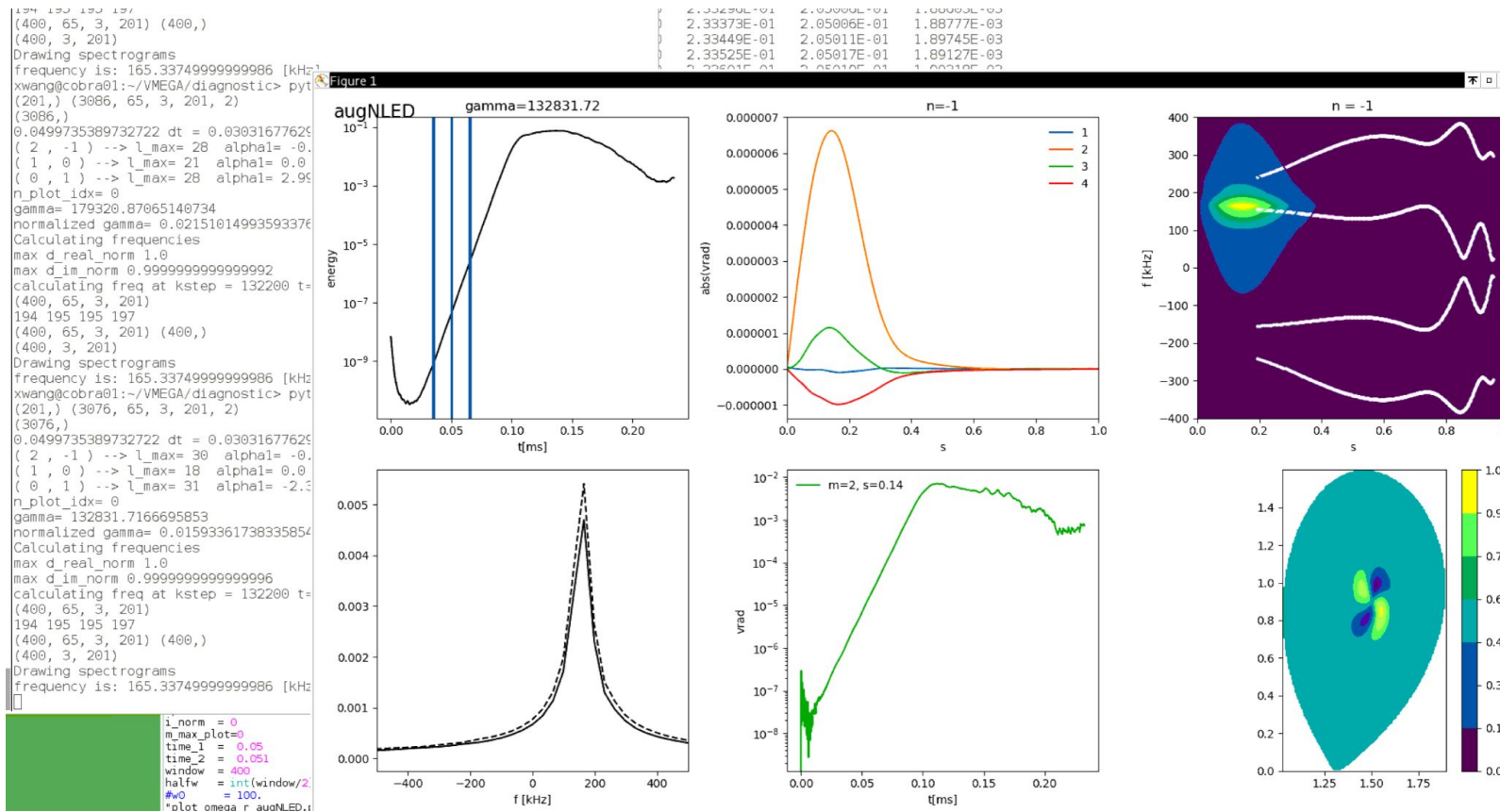
i_norm = 0
m_max_plot=0
time_1 = 0.15
time_2 = 0.151
window = 200
halfw = int(window/2)
rho0 = 100.
*plot omega r augNLED.t

```

Figure 1



Off-axis: density scan (0.6beta)



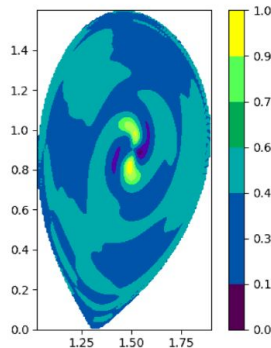
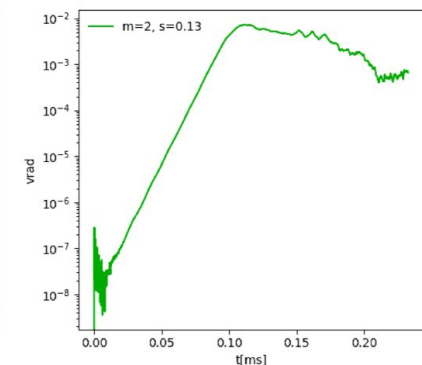
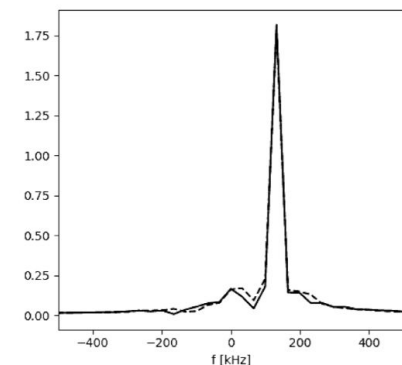
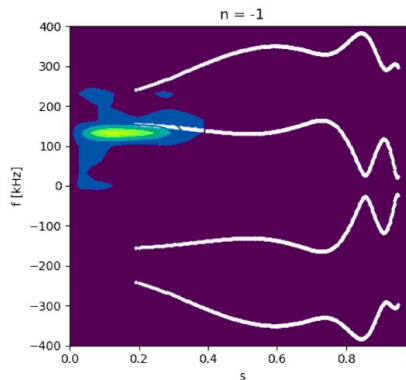
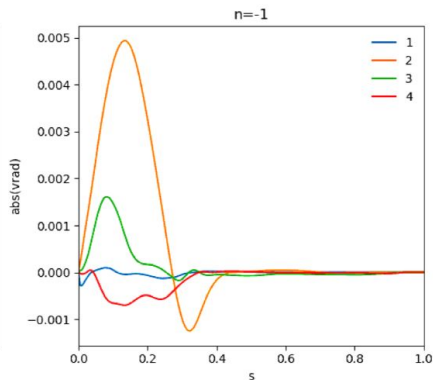
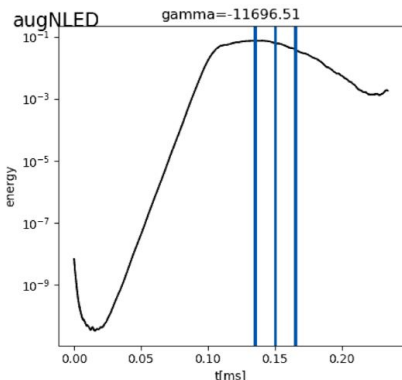
Off-axis: density scan (0.6beta) 1

```

197 195 193 191
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 165.33749999999986 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (3076, 65, 3, 201, 2)
(3076,)
0.0499735389732722 dt = 0.0303167762
( 2, -1) --> l_max= 30 alpha= -0.
( 1, 0) --> l_max= 18 alpha= 0.0
( 0, 1) --> l_max= 31 alpha= -2.3
n_plot_idx= 0
gamma= 132831.7166695853
normalized gamma= 0.01593361738335854
Calculating frequencies
max_d_real_norm 1.0
max_d_im_norm 0.9999999999999996
calculating freq at kstep = 132200 t=
(400, 65, 3, 201)
194 195 195 197
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 165.33749999999986 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (3076, 65, 3, 201, 2)
(3076,)
0.14999621985484962 dt = 0.0303167762
( 2, -1) --> l_max= 28 alpha= 2.8
( 1, 0) --> l_max= 16 alpha= 0.0
( 0, 1) --> l_max= 27 alpha= 0.14
n_plot_idx= 0
gamma= -11696.505324442436
normalized gamma= -0.0014030356998672
Calculating frequencies
max_d_real_norm 1.0
max_d_im_norm 0.9999999999999996
calculating freq at kstep = 396800 t=
(400, 65, 3, 201)
194 195 195 197
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 132.26999999999999 [kHz]
i_norm = 0
m_max_plot=0
time_1 = 0.15
time_2 = 0.01
window = 400
halfw = int(window/2)
#w0 = 100.
*plot omega r augNLED.1

```

Figure 1



Off-axis: density scan (0.6beta) 2

```

(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 165.3374999999986 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (3076, 65, 3, 201, 2)
(3076,)
0.14999621985484962 dt = 0.0303167762
( 2, -1) --> l_max= 28 alpha= 2.8
( 1, 0) --> l_max= 16 alpha= 0.0
( 0, 1) --> l_max= 27 alpha= 0.14
n_plot_idx= 0
gamma= -11696.505324442436
normalized gamma= -0.0014030356998672
Calculating frequencies
max d_real_norm 1.0
max d_im_norm 0.9999999999999996
calculating freq at kstep = 396800 t=
(400, 65, 3, 201)
194 195 195 197
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing Spectrograms
frequency is: 132.26999999999999 [kHz]
xwang@cobra01:~/VMEGA/diagnostic> pyt
(201,) (3076, 65, 3, 201, 2)
(3076,)
0.1999697588292526 dt = 0.0303167762
( 2, -1) --> l_max= 29 alpha= -1.
( 1, 0) --> l_max= 25 alpha= 0.0
( 1, 1) --> l_max= 1 alpha= -0.11
n_plot_idx= 0
gamma= -34286.88766809975
normalized gamma= -0.0041128290973505
Calculating frequencies
max d_real_norm 1.0
max d_im_norm 0.9999999999999996
calculating freq at kstep = 529000 t=
(400, 65, 3, 201)
194 195 195 197
(400, 65, 3, 201) (400,)
(400, 3, 201)
Drawing spectrograms
frequency is: 132.26999999999999 [kHz]

```

Figure 1

