

```
In[*]:= (*Import data from the specified file*)
dataset = Import["/Users/humayrajeba/Documents/Wolfram
Mathematica/THzBlock/Set3_H=135cm_L13=450cm_L12=300cm/DATA_UNCAL_Meas23"];

```

```
In[*]:= (*Define parameters for processing*)
avgParam = 20;
percentage = 5;
{time, signal} = {dataset[[1 ;; 1]], dataset[[1 ;; 2]]};

```

```
In[*]:= signal

```

```
In[*]:= signal

```

```
Out[*]:=

```

```
{5.09572×10-6, 5.09572×10-6, 5.09572×10-6, 5.09572×10-6, 4.9516×10-6, 5.23983×10-6, 4.9516×10-6,
5.09572×10-6, 5.23983×10-6, 5.09572×10-6, 5.09572×10-6, 5.09572×10-6, 4.9516×10-6,
4.9516×10-6, 5.09572×10-6, 5.09572×10-6, 4.9516×10-6, 5.09572×10-6, 5.09572×10-6,
5.23983×10-6, 5.23983×10-6, 5.52806×10-6, 5.52806×10-6, 5.81629×10-6, 5.9604×10-6,
5.9604×10-6, 6.10451×10-6, 6.10451×10-6, 6.39274×10-6, 6.24863×10-6, 6.39274×10-6,
6.53685×10-6, 6.53685×10-6, ... 79 934 ..., 4.51926×10-6, 4.51926×10-6, 4.51926×10-6,
4.66338×10-6, 4.51926×10-6, 4.51926×10-6, 4.66338×10-6, 4.37515×10-6, 4.51926×10-6,
4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6,
4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.66338×10-6, 4.37515×10-6,
4.37515×10-6, 4.37515×10-6, 4.23103×10-6, 4.23103×10-6, 4.23103×10-6,
4.23103×10-6, 4.23103×10-6, 4.23103×10-6, 4.08692×10-6, 4.08692×10-6, 4.08692×10-6}
```

Full expression not available (original memory size: 0.6 MB)



```
In[*]:= signal

```

```
Out[*]:=

```

```
{5.09572×10-6, 5.09572×10-6, 5.09572×10-6, 5.09572×10-6, 4.9516×10-6, 5.23983×10-6, 4.9516×10-6,
5.09572×10-6, 5.23983×10-6, 5.09572×10-6, 5.09572×10-6, 5.09572×10-6, 4.9516×10-6,
4.9516×10-6, 5.09572×10-6, 5.09572×10-6, 4.9516×10-6, 5.09572×10-6, 5.09572×10-6,
5.23983×10-6, 5.23983×10-6, 5.52806×10-6, 5.52806×10-6, 5.81629×10-6, 5.9604×10-6,
5.9604×10-6, 6.10451×10-6, 6.10451×10-6, 6.39274×10-6, 6.24863×10-6, 6.39274×10-6,
6.53685×10-6, 6.53685×10-6, ... 79 934 ..., 4.51926×10-6, 4.51926×10-6, 4.51926×10-6,
4.66338×10-6, 4.51926×10-6, 4.51926×10-6, 4.66338×10-6, 4.37515×10-6, 4.51926×10-6,
4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6,
4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.51926×10-6, 4.66338×10-6, 4.37515×10-6,
4.37515×10-6, 4.37515×10-6, 4.23103×10-6, 4.23103×10-6, 4.23103×10-6,
4.23103×10-6, 4.23103×10-6, 4.23103×10-6, 4.08692×10-6, 4.08692×10-6, 4.08692×10-6}
```

Full expression not available (original memory size: 0.6 MB)



```
In[*]:= (*Calculate the weighted signal and its exponential moving average*)
weightedSignal = 10 * Log10[signal]
```

Out[*]=

```
{-52.9279, -52.9279, -52.9279, -52.9279, -53.0525, -52.8068, -53.0525, -52.9279, -52.8068, -52.9279,
-52.9279, -52.9279, -53.0525, -53.0525, -52.9279, -52.9279, -53.0525, -52.9279, -52.9279, -52.8068,
-52.8068, -52.5743, -52.5743, -52.3535, ... 79 952 ..., -53.4493, -53.4493, -53.4493, -53.4493,
-53.4493, -53.4493, -53.4493, -53.4493, -53.4493, -53.313, -53.5901, -53.5901, -53.5901,
-53.5901, -53.7355, -53.7355, -53.7355, -53.7355, -53.7355, -53.7355, -53.7355, -53.886, -53.886, -53.886}
```

Full expression not available (original memory size: 2 MB)



```
In[*]:= decayRate = 0.005;
movingAvg = Re[ExponentialMovingAverage[weightedSignal, decayRate]]
```

Out[*]=

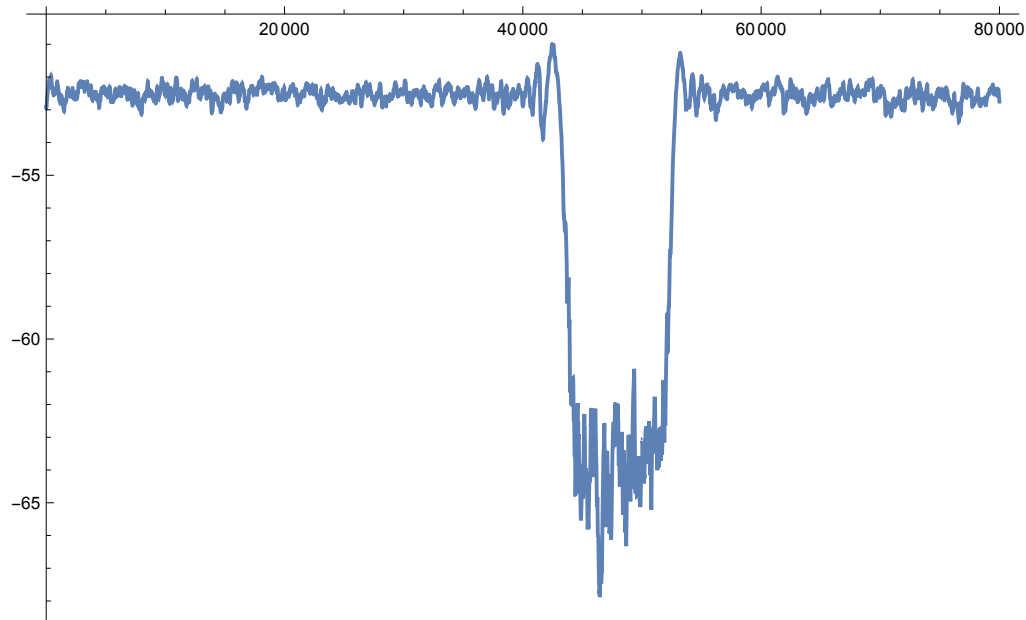
```
{-52.9279, -52.9279, -52.9279, -52.9279, -52.9286, -52.928, -52.9286, -52.9286,
-52.928, -52.928, -52.928, -52.928, -52.9286, -52.9292, -52.9292, -52.9292, -52.9298,
-52.9298, -52.9298, -52.9292, -52.9286, -52.9268, -52.925, -52.9222, ... 79 952 ...,
-52.6456, -52.6497, -52.6537, -52.6576, -52.6616, -52.6655, -52.6694, -52.6733,
-52.6772, -52.6811, -52.6842, -52.6888, -52.6933, -52.6978, -52.7022, -52.7074,
-52.7125, -52.7177, -52.7227, -52.7278, -52.7328, -52.7386, -52.7443, -52.7501}
```

Full expression not available (original memory size: 1.9 MB)



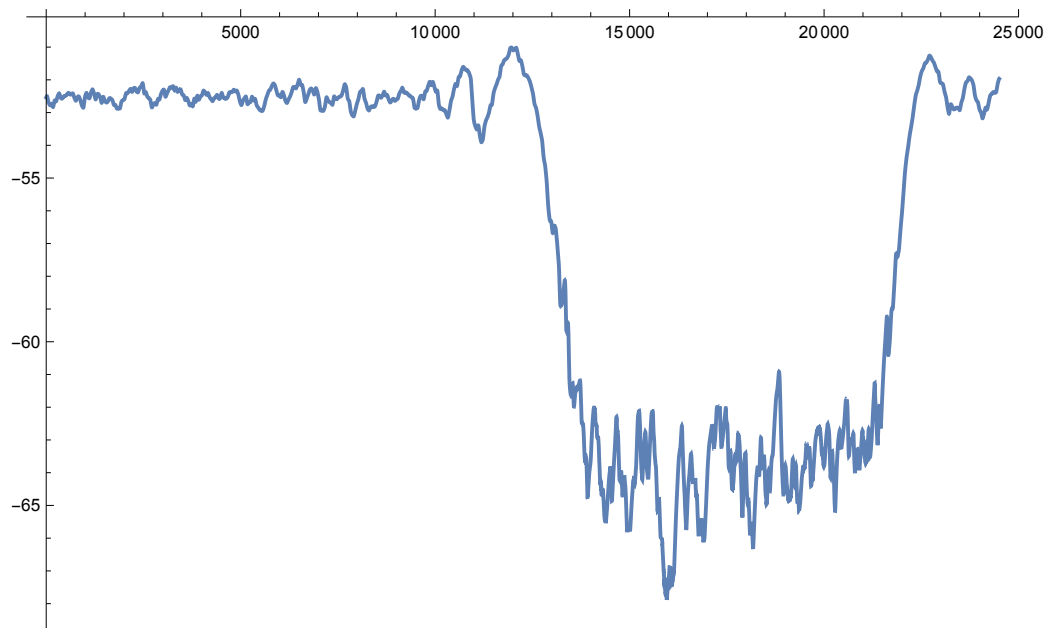
```
In[*]:= ListLinePlot[movingAvg, PlotRange -> All]
```

Out[*]=



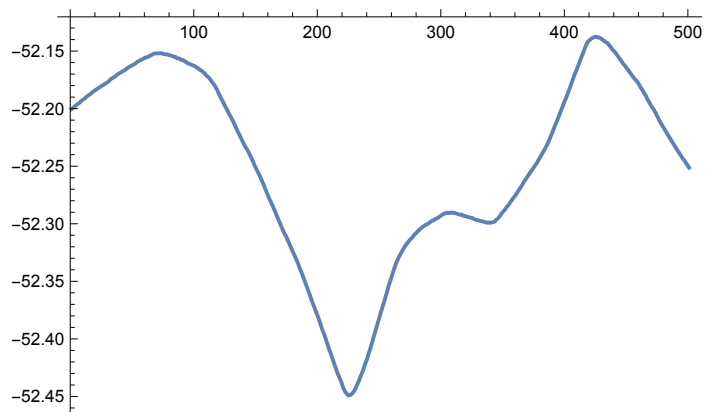
```
In[*]:= ListLinePlot@Take[movingAvg, {30 500, 55 000}]
```

```
Out[*]=
```



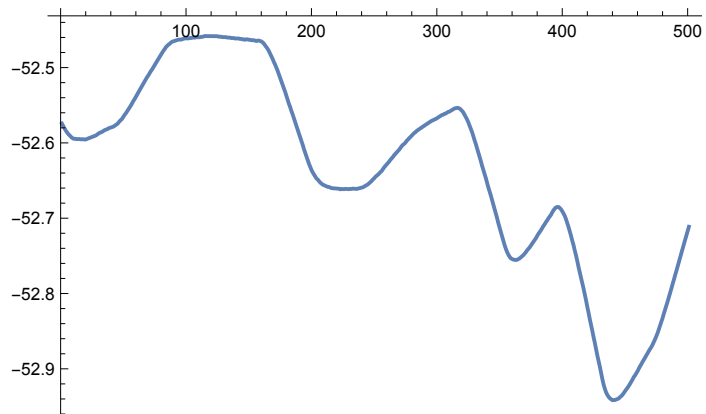
```
In[*]:= ListLinePlot@Take[movingAvg, {3000, 3500}]
```

```
Out[*]=
```



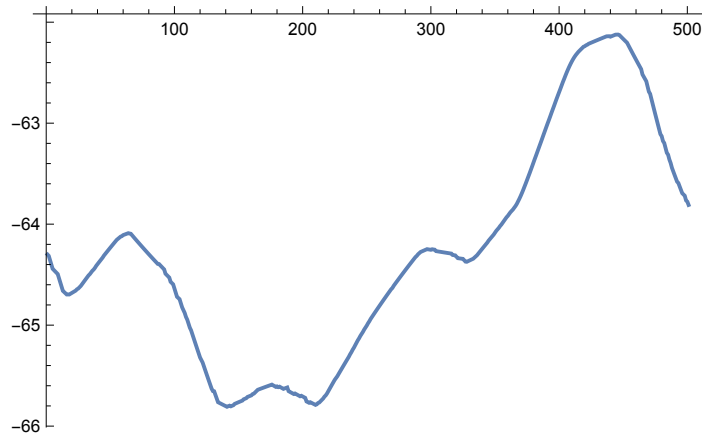
```
In[*]:= ListLinePlot@Take[movingAvg, {4000, 4500}]
```

```
Out[*]=
```



```
In[*]:= ListLinePlot@Take[movingAvg, {45300, 45800}]
```

Out[*]=



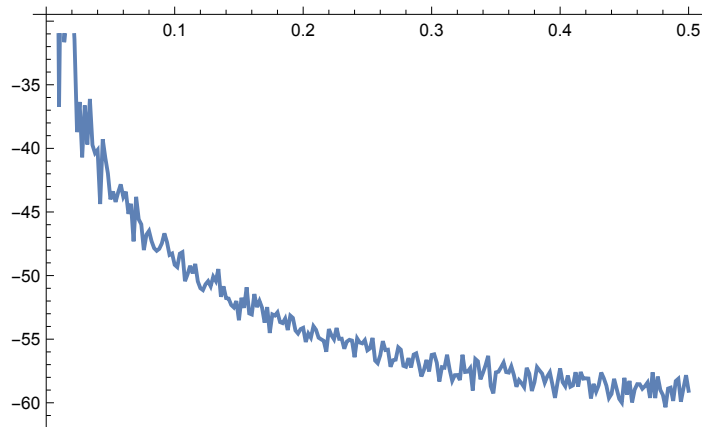
```
In[*]:= nonBlocked = Take[movingAvg, {3000, 3500}];  
oscillating = Take[movingAvg, {4000, 4500}];  
blocked = Take[movingAvg, {45300, 45800}];
```

```

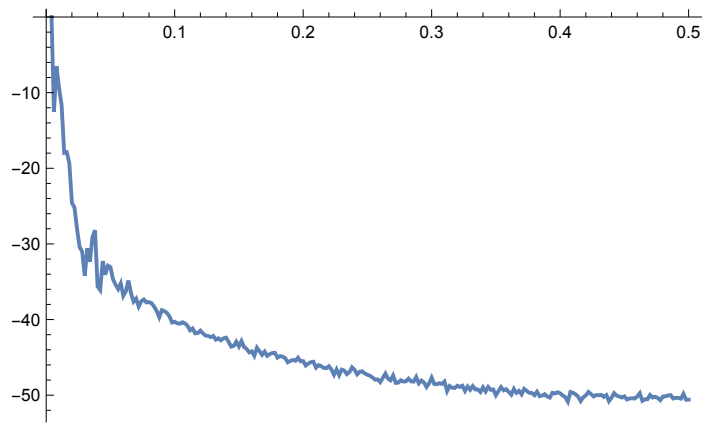
In[ ]:= periodogramNonBlocked = Periodogram[nonBlocked, PlotStyle -> DarkRed]
periodogramOscillating = Periodogram[oscillating, PlotStyle -> DarkMagenta]
periodogramBlocked = Periodogram[blocked, PlotStyle -> DarkGreen]

```

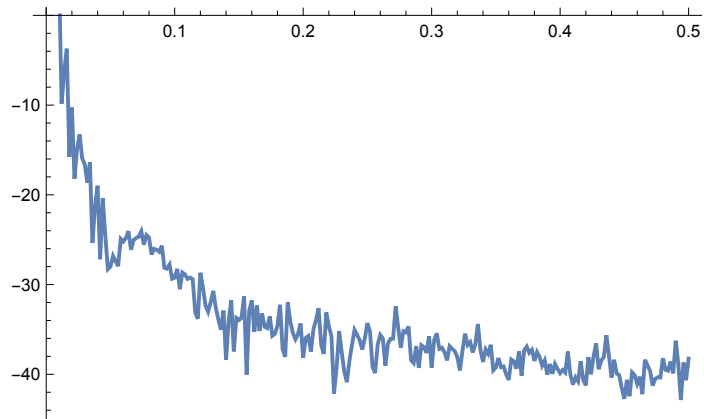
Out[]:=

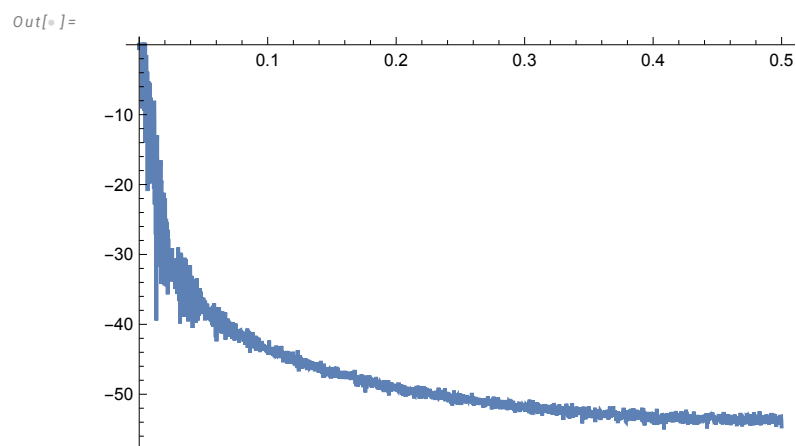
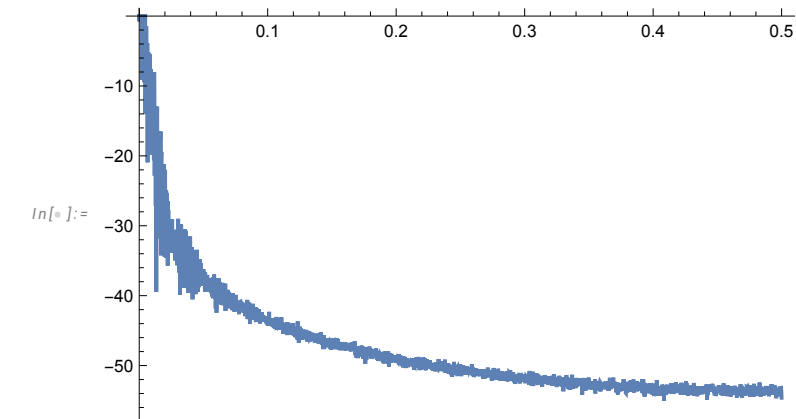


Out[]:=



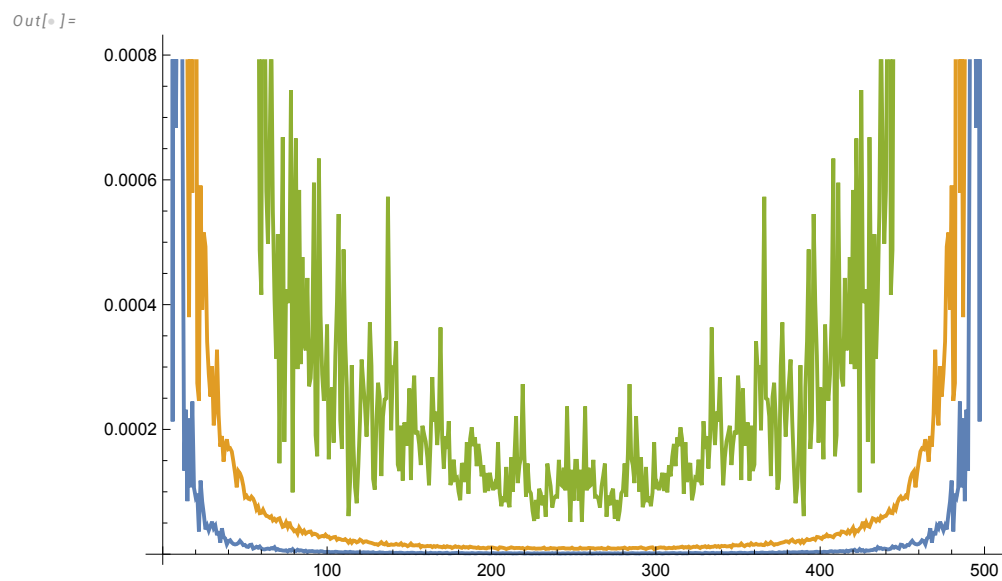
Out[]:=





```
In[ ]:= powerSpectrumNonBlocked = PeriodogramArray[nonBlocked];
powerSpectrumOscillating = PeriodogramArray[oscillating];
powerSpectrumBlocked = PeriodogramArray[blocked];
```

```
In[ ]:= ListLinePlot[
  {powerSpectrumNonBlocked, powerSpectrumOscillating, powerSpectrumBlocked}]
```

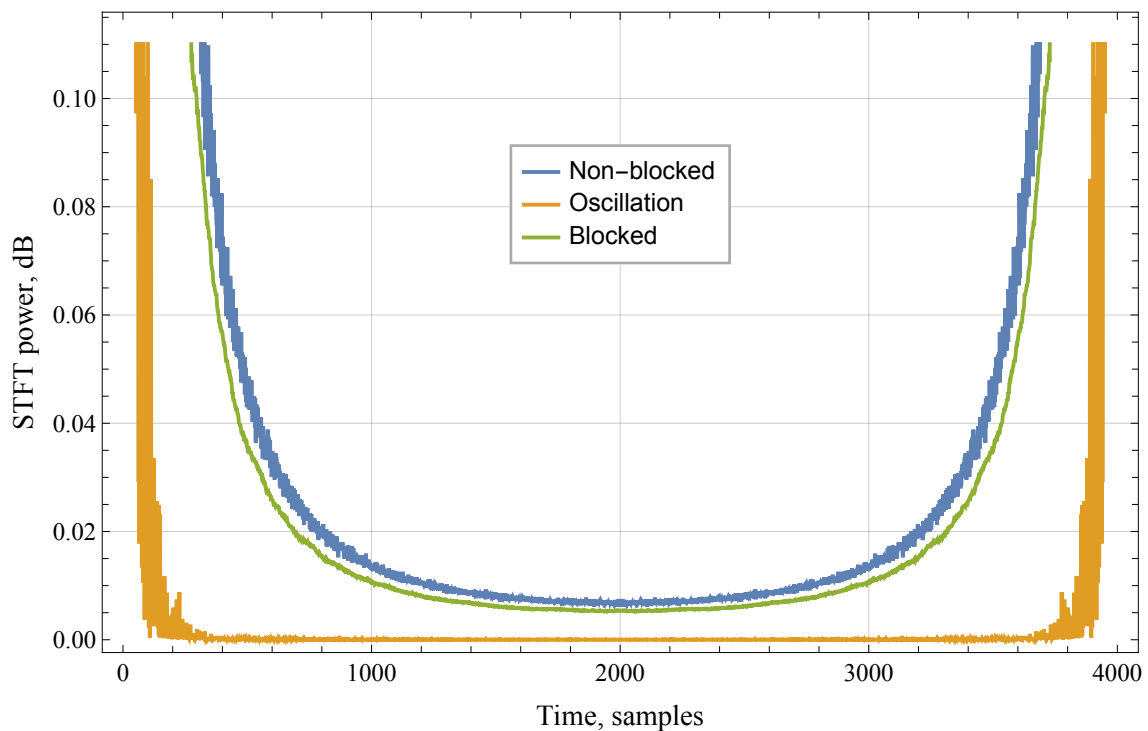
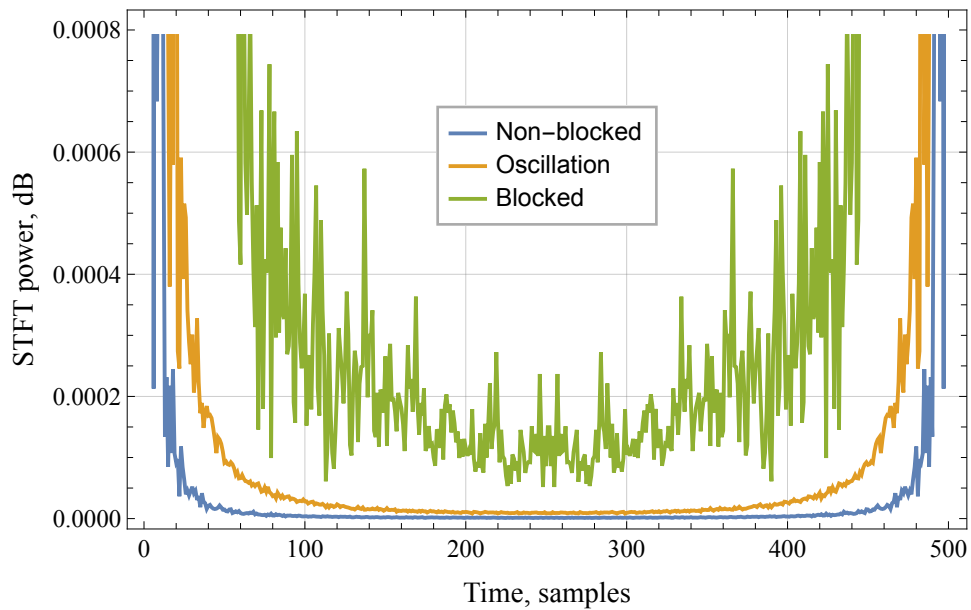


```

In[ ]:= ListLinePlot[{powerSpectrumNonBlocked,
  powerSpectrumOscillating, powerSpectrumBlocked}, GridLines -> Automatic,
  LabelStyle -> {FontSize -> 13, FontFamily -> "Times New Roman"},
  Frame -> True, FrameLabel ->
    {Style["Time, samples", Black, 15], Style["STFT power, dB", Black, 15]},
  PlotLegends -> Placed[LineLegend[{"Non-blocked", "Oscillation", "Blocked"},
    LegendFunction -> (Framed[#, FrameMargins -> 0, Background -> White,
      FrameStyle -> Lighter[Gray]] &), LabelStyle -> Directive[FontSize -> 13],
    LegendMargins -> 5, Spacings -> {0.35, {0.5, 0.7}}, {0.5, 0.7}], ImageSize -> 500]

```

Out[]:=



In[]:=

Out[] =

