

# Plots of Xray – Metals experiment

## 1 IN-LAB PLOTS LIST.

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- You need to plot every spectrum you record according to brief document. As (Channel, Counts).
- And you need to prepare a channel – energy calibration plot. Do a linear regression.
- Then you need to plot the spectrum you record earlier as (Energy, Counts).

## 2 IMPORTING SPECTRUM AND FIND LINES

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This is the typical procedure you can use. You measure a spectrum and save it to a file, like “Mes1.txt”. Then you can use a code similar to the one below to import and smooth the data, and to plot it.

```
def smooth(y, box_pts):  
    box = np.ones(box_pts)/box_pts #running average  
    y_smooth = np.convolve(y, box, mode='same')  
    return y_smooth  
  
Mes1 = pd.read_csv('Mes1.txt',sep='\t',header=1) # read the data.  
  
Counts = np.array(Mes1['Impulses/#']) # Impulses  
Counts_smoothed=smooth(Counts, 10) # smooth the data over 10 channels  
Channels = np.array(Mes1['Channel/#']) # Channel
```

Find the lines energy, using for example:

```
from scipy.signal import find_peaks  
peaks, _ = find_peaks(Counts_smoothed, height=100, prominence=40)
```

and plot them:

```
plt.figure(dpi=300)  
plt.plot(Channels ,Counts_smoothed, label='Original Mo-tube spectrum')  
plt.plot(Channels[peaks] ,Counts_smoothed[peaks], "x",color='red',  
label='Lines')  
plt.ylabel('Impulses')  
plt.xlabel('Channels')  
plt.legend()
```