In [3]:
```
from astropy.io import fits
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy
```

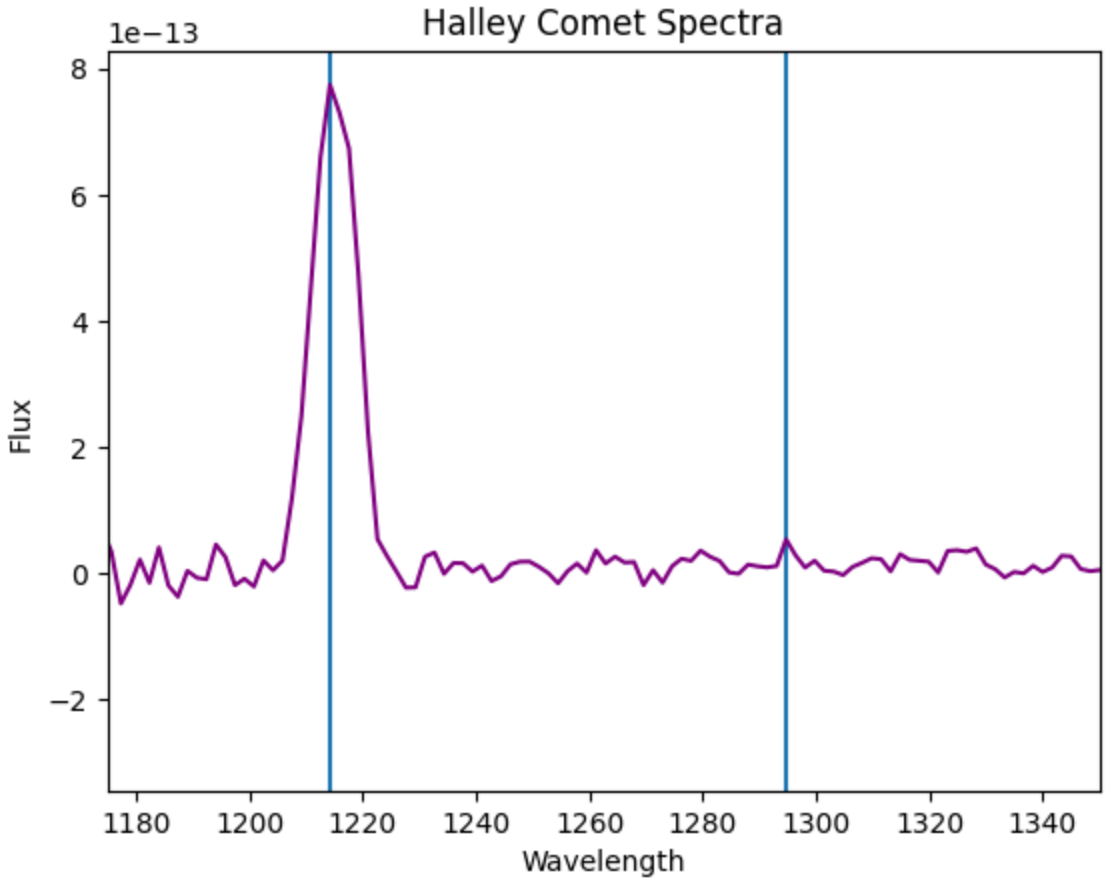
In [4]:
```
data = fits.open('halley_low.fit')
data.info()
```

```
Filename: halley_low.fit
No.    Name      Ver    Type      Cards   Dimensions   Format
  0  PRIMARY       1 PrimaryHDU      65   ()
  1                1 BinTableHDU     25   495R x 4C   [1E, 1E, 1E, 1I]
```

In [5]:
```
comet = pd.DataFrame()
comet['Wavelength'] = pd.DataFrame(data[1].data['WAVELENGTH'])
comet['Flux'] = pd.DataFrame(data[1].data['FLUX'])
```

In [14]:
```
peaks = scipy.signal.find_peaks(comet['Flux'], height=0.00000000000005)
peaks[0]
for peak in peaks[0]:
    plt.axvline(comet['Wavelength'][peak])
plt.plot(comet['Wavelength'], comet['Flux'], color='purple')
plt.xlim([1175, 1350])
plt.xlabel('Wavelength')
plt.ylabel('Flux')
plt.title('Halley Comet Spectra')
```

Out[14]:
```
Text(0.5, 1.0, 'Halley Comet Spectra')
```



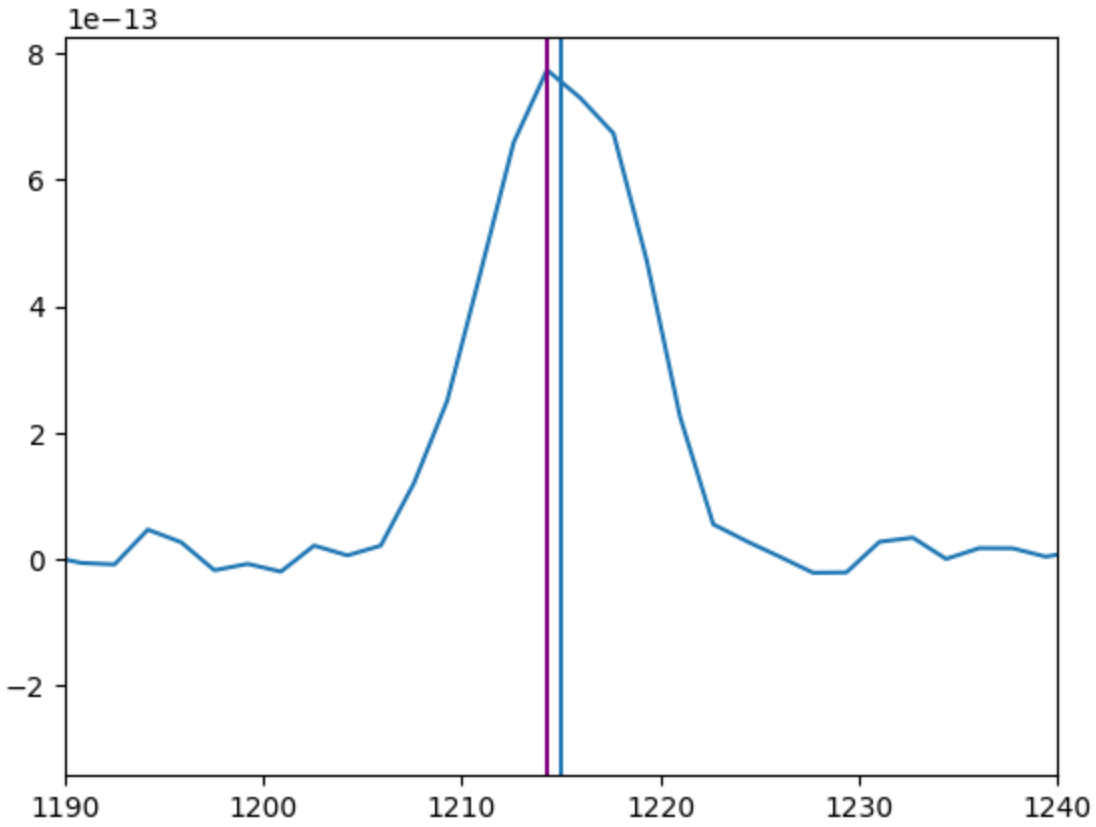
In [7]:
```
for peak in peaks[0]:
    print(comet['Wavelength'][peak])
```

```
1153.9338
1158.963
1162.3158
1170.6979
1174.0507
1214.2843
1294.7515
```

Hydrogen lines are at 1215.7

In [12]:
```
peak = 1215
plt.plot(comet['Wavelength'], comet['Flux'])
plt.xlim([peak - 25, peak + 25])
plt.axvline(peak)
plt.axvline(1214.2843, color='purple')
```

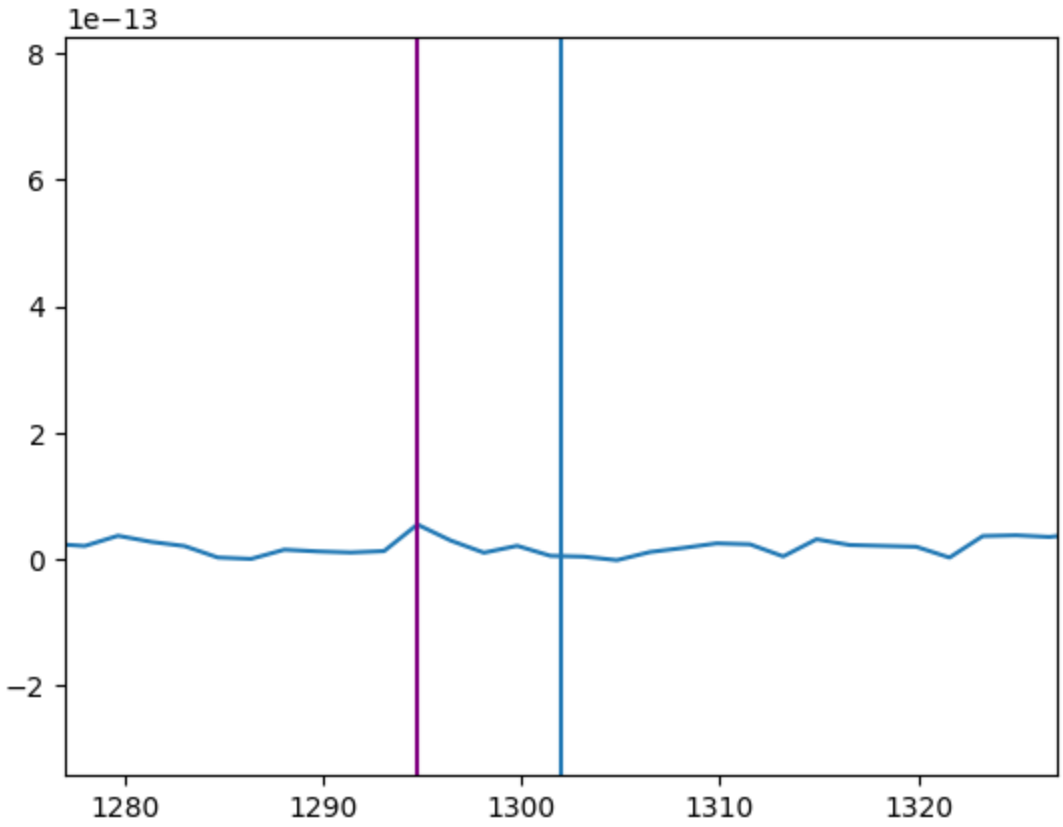
Out[12]: `<matplotlib.lines.Line2D at 0x1dff2e68f10>`



hydrogen and oxygen

In [11]:
```
peak = 1302
plt.plot(comet['Wavelength'], comet['Flux'])
plt.xlim([peak - 25, peak + 25])
plt.axvline(peak)
plt.axvline(1294.7515, color='purple')
```

Out[11]: <matplotlib.lines.Line2D at 0x1dff2bc8f10>



In [ ]:

In [2]:
```
from astropy.io import fits
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import scipy
```

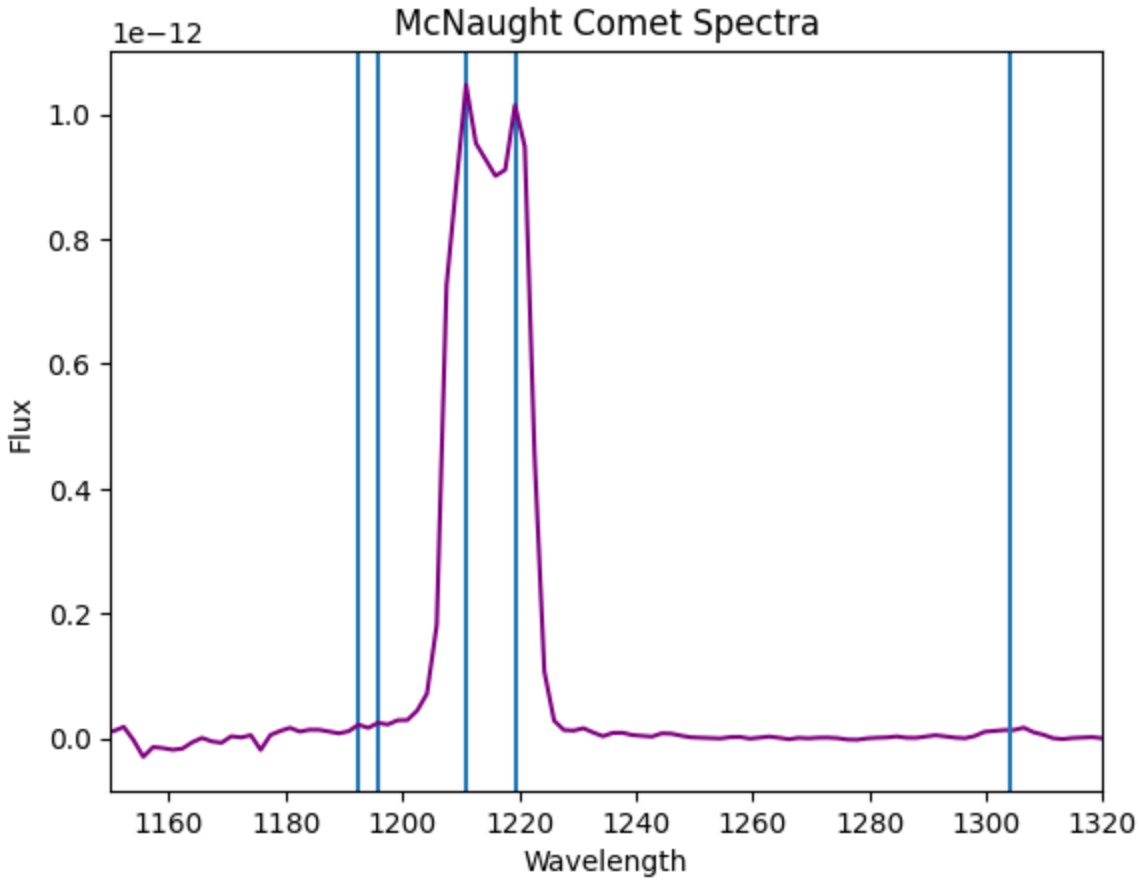
In [3]:
```
data = fits.open('mcnaught_low.fit')
data.info()
```

```
Filename: mcnaught_low.fit
No.    Name      Ver    Type      Cards   Dimensions   Format
  0  PRIMARY       1 PrimaryHDU      74   ()
  1                1 BinTableHDU     25   495R x 4C   [1E, 1E, 1E, 1I]
```

In [4]:
```
comet = pd.DataFrame()
comet['Wavelength'] = pd.DataFrame(data[1].data['WAVELENGTH'])
comet['Flux'] = pd.DataFrame(data[1].data['FLUX'])
```

In [14]:
```
peaks = scipy.signal.find_peaks(comet['Flux'], height=0.00000000000002)
peaks[0]
for peak in peaks[0]:
    plt.axvline(comet['Wavelength'][peak])
plt.plot(comet['Wavelength'], comet['Flux'], color='purple')
plt.axvline(1304)
plt.xlim([1150, 1320])
plt.xlabel('Wavelength')
plt.ylabel('Flux')
plt.title('McNaught Comet Spectra')
```

Out[14]:
```
Text(0.5, 1.0, 'McNaught Comet Spectra')
```



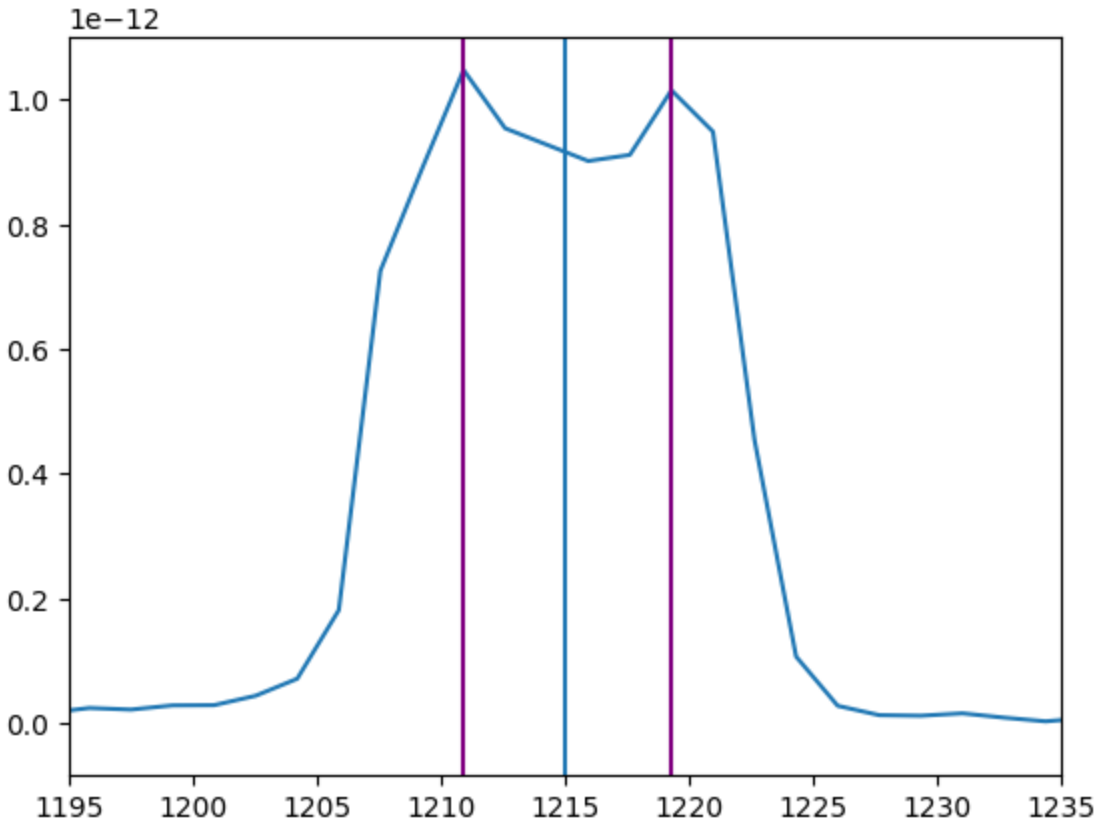
In [6]:
```
for peak in peaks[0]:
    print(comet['Wavelength'][peak])
```

```
1192.4911
1195.8439
1210.9314
1219.3135
```

Hydrogen lines are at 1215.7

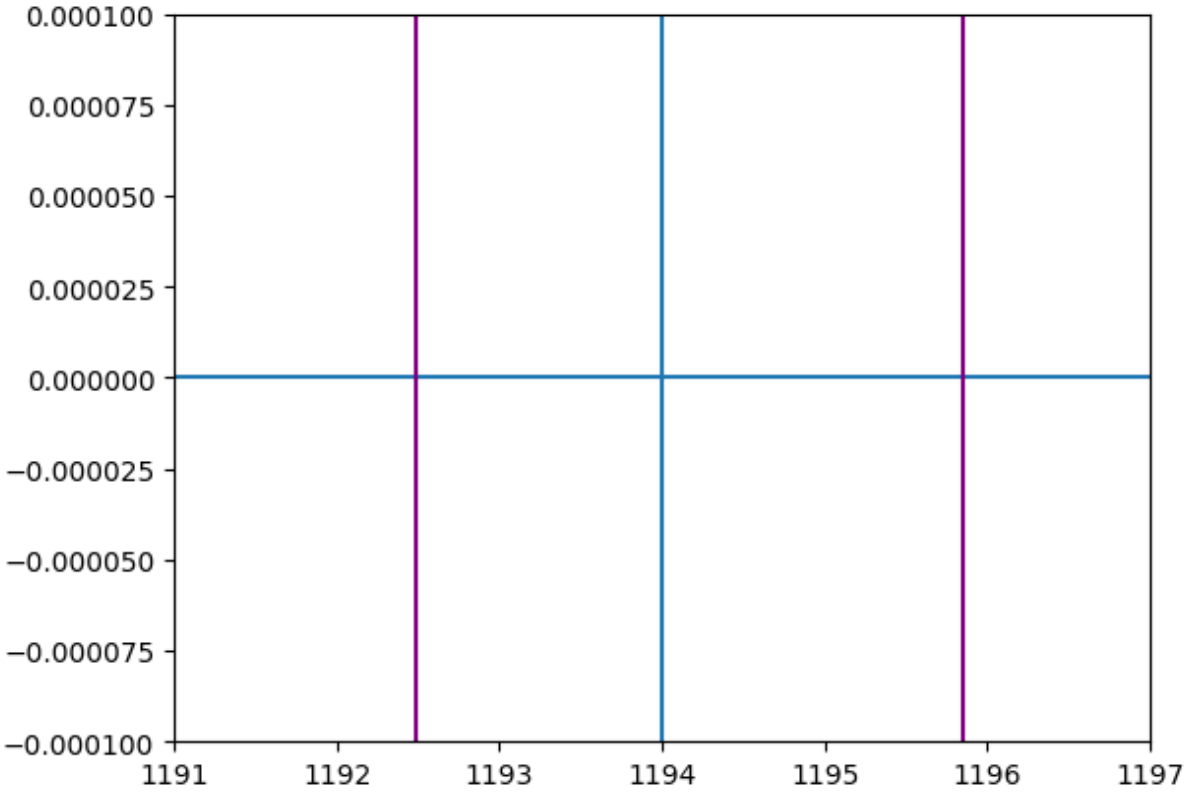
In [7]:
```
peak = 1215
plt.plot(comet['Wavelength'], comet['Flux'])
plt.xlim([peak - 20, peak + 20])
plt.axvline(peak)
plt.axvline(1210.9314, color='purple')
plt.axvline(1219.3135, color='purple')
```

Out[7]: <matplotlib.lines.Line2D at 0x16500789d50>



In [10]:
```
peak = 1194
plt.plot(comet['Wavelength'], comet['Flux'])
plt.xlim([peak - 3, peak + 3])
plt.axvline(peak)
plt.axvline(1192.4911, color='purple')
plt.axvline(1195.8439, color='purple')
plt.ylim([-.0001,.0001])
```

Out[10]: (-0.0001, 0.0001)



the present peaks suggest hydrogen and silicone

In [ ]:

In [ ]: