**Week 4 HT**

**Build**

The figures below summarize the experimental results over trials. LHS distribution of central wavelengths around the actual wavelength; RHS distribution of peak intensities

A picture containing text

Description automatically generated

The two distributions are uncorrelated with each other

A screenshot of a cell phone

Description automatically generated

**Build**

Remove baseline + remove outlier + interpolate + smooth. Without removing outliers, however, the interpolated and smoothed data looks like

* **Baseline**

The baseline should not be removed using the dark frame count, as this would only remove the dark current but not the bright current and any current induced by the temperature variation in the presence of the light [verify this].

The baseline can be removed using four algorithms: remove mode, median filter, baseline package and high-pass filter. The first method which is removing the mode is preferred [verify this] by inspection.

|  |  |
| --- | --- |
| A picture containing object  Description automatically generated | A close up of a mans face  Description automatically generated |

* **Outliers**
* **Interpolate**

The interpolation gives us a uniform between the max and min frequencies. It also gives a finer resolution of the wavelength space. However, we couldn’t claim that this approach improves the accuracy for determining the peak wavelength [something to do with the Nyquist frequency and we need to investigate it].

* **Smoothing**

The algorithm used for smoothing is the filter, which is a commonly used non-parametric (without assuming any distribution) filter to smooth data [discuss this in the report].

**Week 5 HT**

**Build**

The method can now plot the distribution of the central wavelength, peak intensity, integrated intensity, the scatter plot for peak intensity and integrated intensity, and finally the time series of the above values.

**Build**

TODO: Find the optimal exposure time for the spectrometer – what is the optimal strategy for that?

TODO: Use time series analysis methods to analyse the time series data

TODO: Use the laser to calibrate for the spectrometer