

## Week 2 - Week commencing 7/2/2022

### **Week Outline**

Online meeting to discuss the next step of the data analysis and to clear up misconceptions about obtaining dF0 and responsivity of the KID. As explained, the next step is to read-in I and Q values and converting them to a dF0. Mostly as a continuation of last week's data and camera visit and project overview. By doing so, we will be able to use these dF0 values in finding a response by the detector.

### **Complete Python Code Attached at the End of Diary**

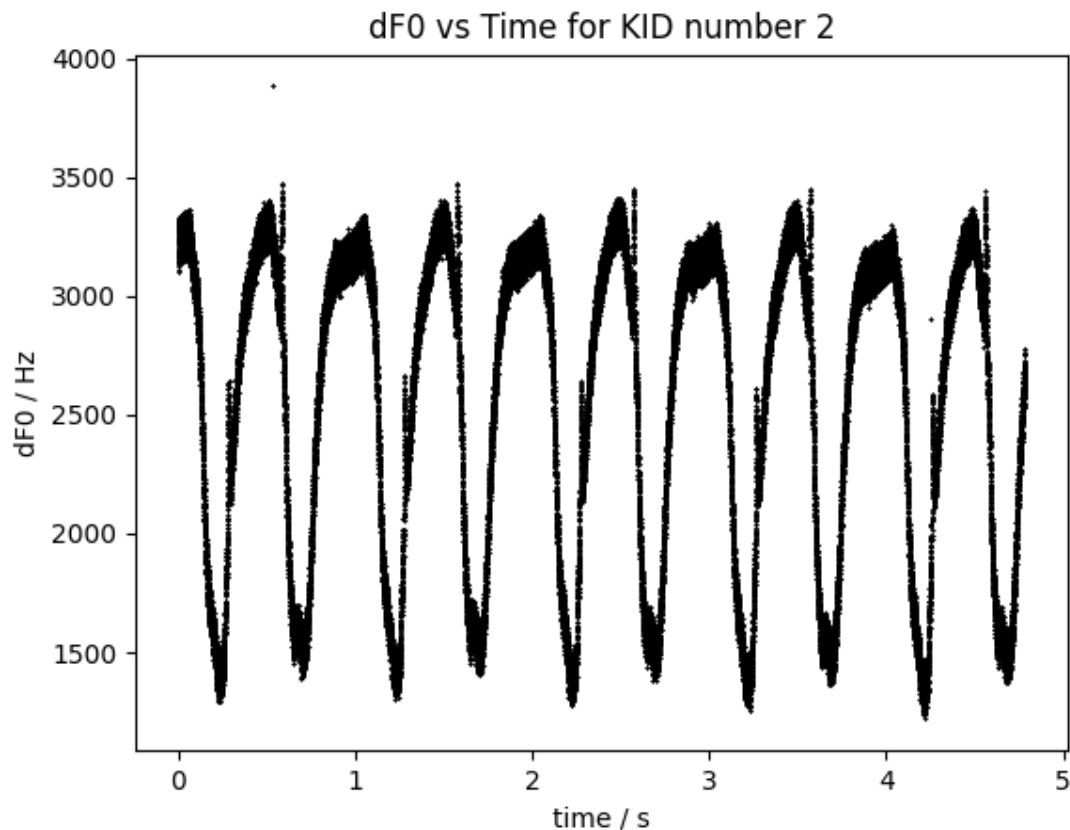
### **Tasks Outline**

- Convert I and Q values to dF0 using the "Magic Formula" for hot bar data:

$$dF_0 = \frac{dI(t) \frac{dI}{dF} + dQ(t) \frac{dQ}{dF}}{\frac{dI^2}{dF} + \frac{dQ^2}{dF}}$$

- Identify hot bar within data.

### Graph of dF0 vs Time



This is **detector data for the hot bar for KID Number 2**. here are 2 distinct features visible, the large oscillating wave is the reflection of the detector screen as it oscillates. The small peaks present on the large waves are the hot bar. As the detector scans up and down, the hot bar falls in the camera's field of view momentarily. The hot bar will have a Gaussian curve with a peak height as the detector takes an integration time to "warm up" to the detection of the hot bar and it "cools down" again as it moves away.

One would expect the oscillating features to be symmetrical as it scans up and down or at a different time, however this is not the case. For example, the reflection and hot bar peaks and curves are not identical to itself in a different time. One of the main contributing reasons is of course the background as it is measured in a "un-ideal" scene with many furniture and objects, at fluctuating "room temperature", which may annoyingly "add extra features" to the curves.

The other reason is that the detector temperature fluctuates. One can imagine due to the internal electronics and the mechanism to regulate the heat itself may produce heat, and other factors such as temperature fluctuations may cause the detector temperature to not remain constant. The detector temperature was advised to only remain somewhat constant for around ~30 seconds before it deviates significantly. This may lead to some additional features to the curves as well.