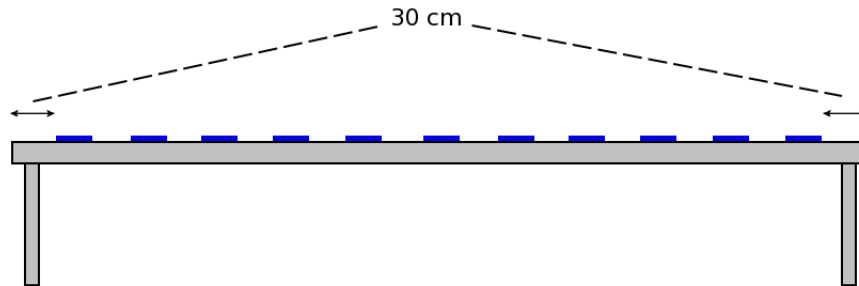# 1 Smartphone Experiment

Make an array of your phones, equally spaced, at the long side of the large table in the lab. Make sure to leave 30 cm margins at both ends of the table (Fig. 1). Label the phone position with a Post-It note and include your phone's label in your lab report.

Figure 1: Array of phones on the large table
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Data Acquisition:

1. Run the seismometer app (e.g. Seismometer 6th Pro) on the phones.

2. Pound "three times" with <u>with small intervals</u> at one end of the phone array and observe how the corresponding signal shows up on different phones in the array.

3. Stop the recoding process.

Question

From what you have learned in the lecture and lab, explain how and why the signal changes though phones in the array.

4. Using EXCEL or your favorite plotting software, plot your recording with measurements and time on the vertical and horizontal axes. Remember to put units and labels on the axes.

5. Upload a copy of your CSV file from the array experiment onto the designated upload space with your label number in the file name (e.g. XX.YOUR_NAME).

6. Download all the uploaded files into a directory on your computer.

Note:

There *may* be a formatting issue here. However, in principle, all the smartphones should create several-column files in TIME-AMPLITUDE format. In the first couple of columns (or perhaps *all together* on the first, depending on the phone), you will have a date-time sequence and on the rest you will have values for X, Y, and Z components.

7. In each file, find the time at which the maximum value on the Z-axis had occurred (Hint: Sampling rates and start of the records CAN be different in the phones).

8. Make a 2-column table with phone label and the arrival times of the maximum amplitudes.

9. Plot the file you made with labels on the horizontal and the arrival times of the maximum amplitudes on the vertical axes.
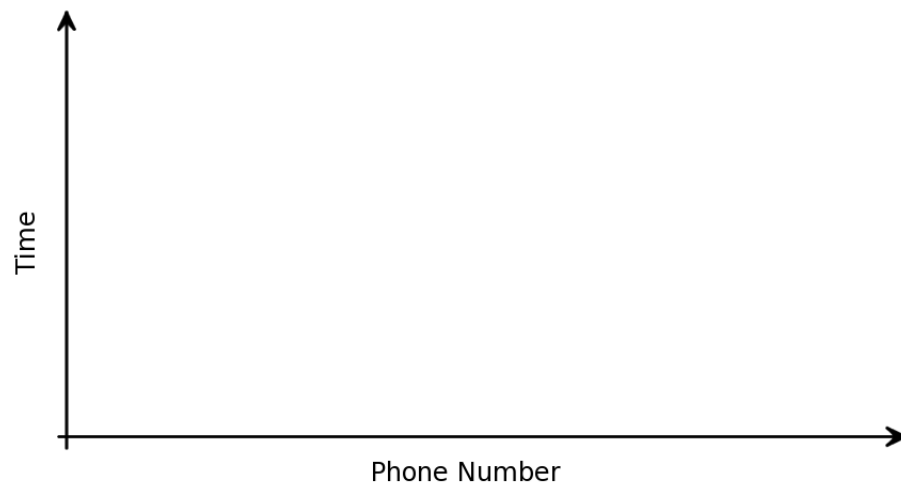
10. Do you see any pattern? Why or why not? Explain.

11. Fit a line to your "maximum" points on the plot above.

12. The slope of this line will be the inverse of velocity. Why?

13. What is the velocity of P-waves in the table?

14. Why do you think the amplitudes for the arrivals are not as reliable as their timing?