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Introduction

Superconductors are substances that are able to super conduct when at sufficiently low temperatures. To super conduct means to conduct electricity without any electrical resistance. As a result, superconductors are able to conduct electricity more efficiently and levitate when present with a strong magnet. Our experiment was conducted to explore the mass and power aspect of superconductors. Through this we hope to understand other implication of superconductors in our community. It is hypothesised that magnetic mass and its field strength exerted is directly proportional due to the presence of greater magnetic matter. In addition to this it can also be predicted that the field strength and the height of levitation of the superconductor above the track is also directly proportional since greater repulsion of the superconductor.

Future Projects involving Superconductivity:

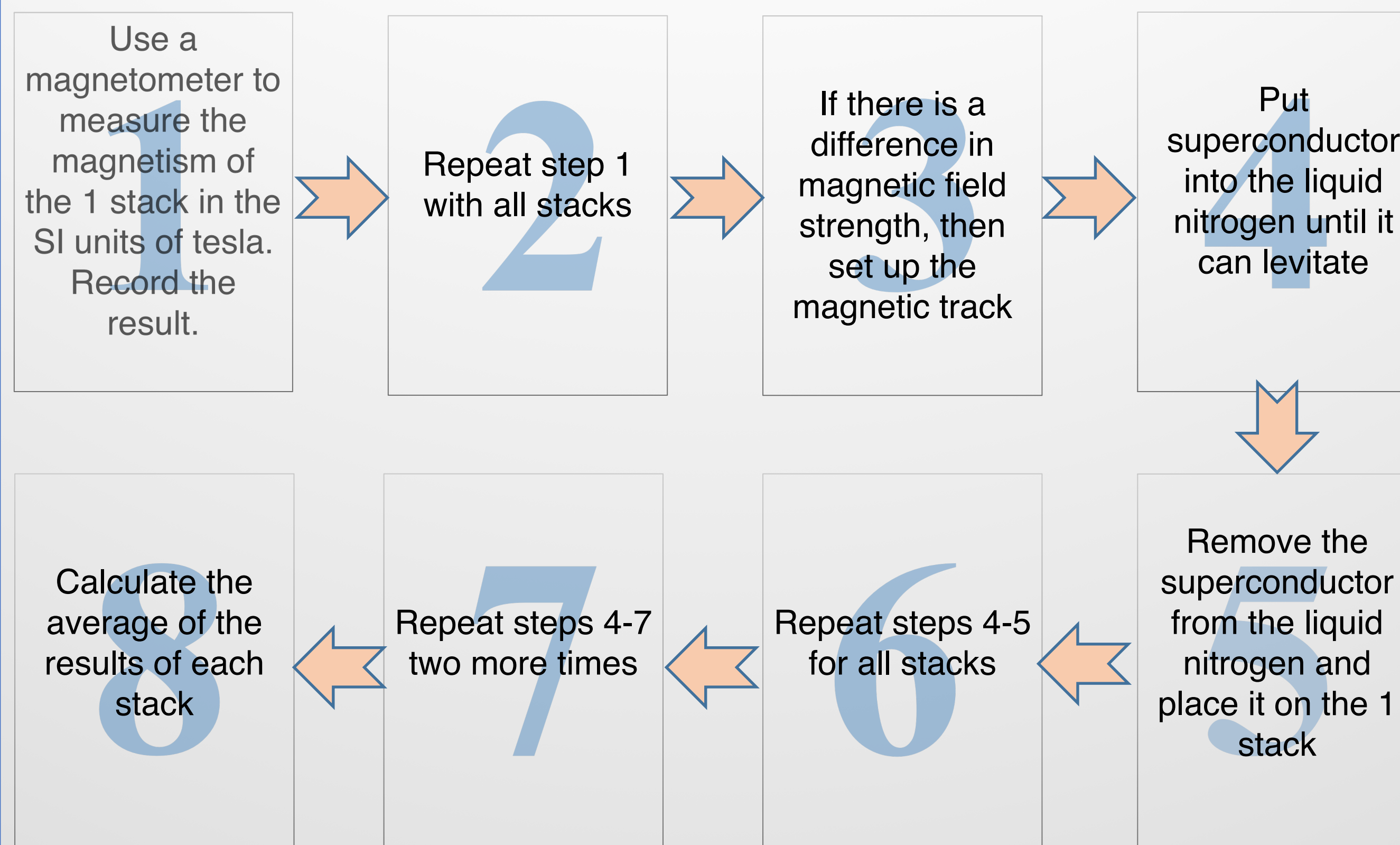
- ❖ Quantum Train
- ❖ Magnetic Resonance Imaging (MRI)
- ❖ Electromagnetic Drive
- ❖ LHC
- ❖ Cars/Buses/Trucks

Materials

- Superconductor set – 1
- Neodymium magnets – 64 pieces
- Magnetometer – 1
- Ruler – 1
- Sticky Tape – 1
- Liquid Nitrogen – 500ml
- Timer - 1

Method

Note: 1 stack = 4 magnets placed horizontally



Results

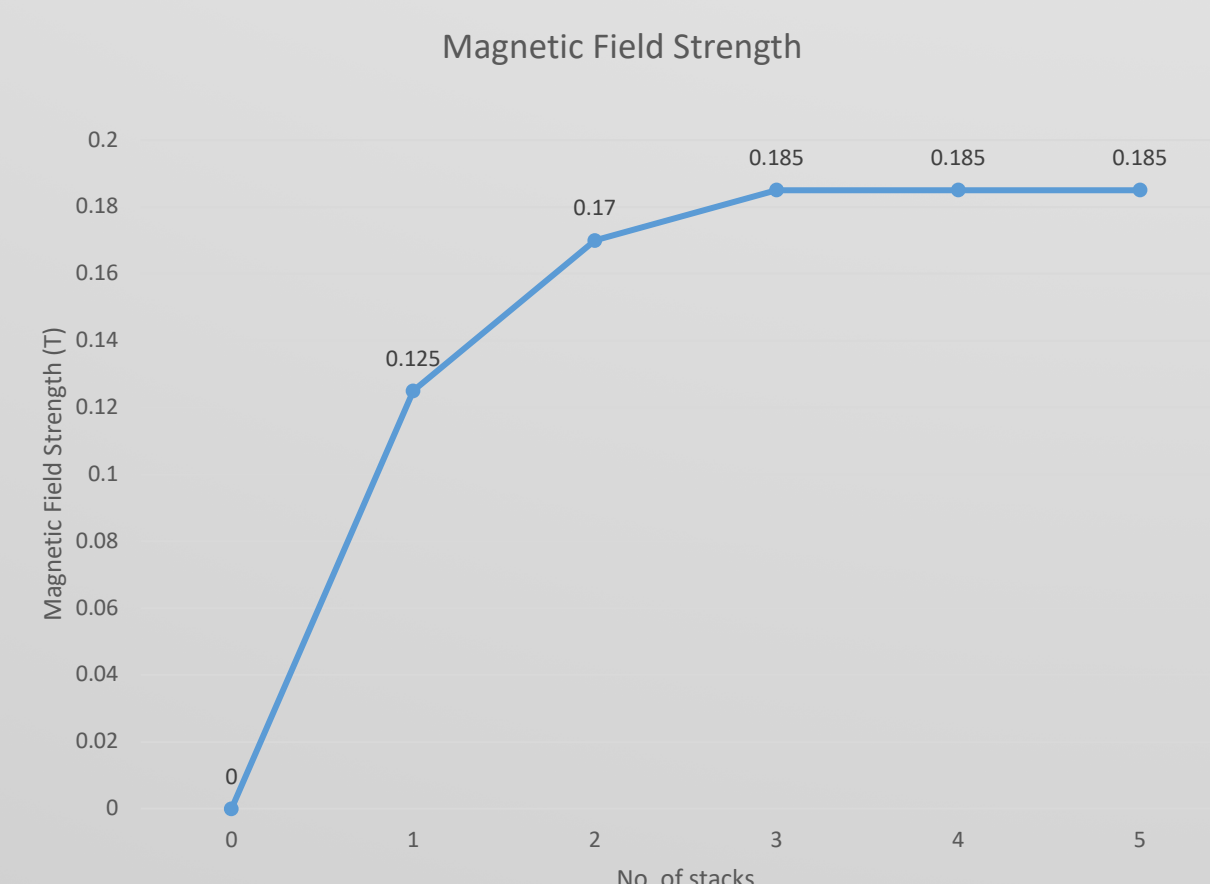


FIGURE 1.1 – EFFECTS OF MAGNETIC MASS ON IT'S FIELD STRENGTH.

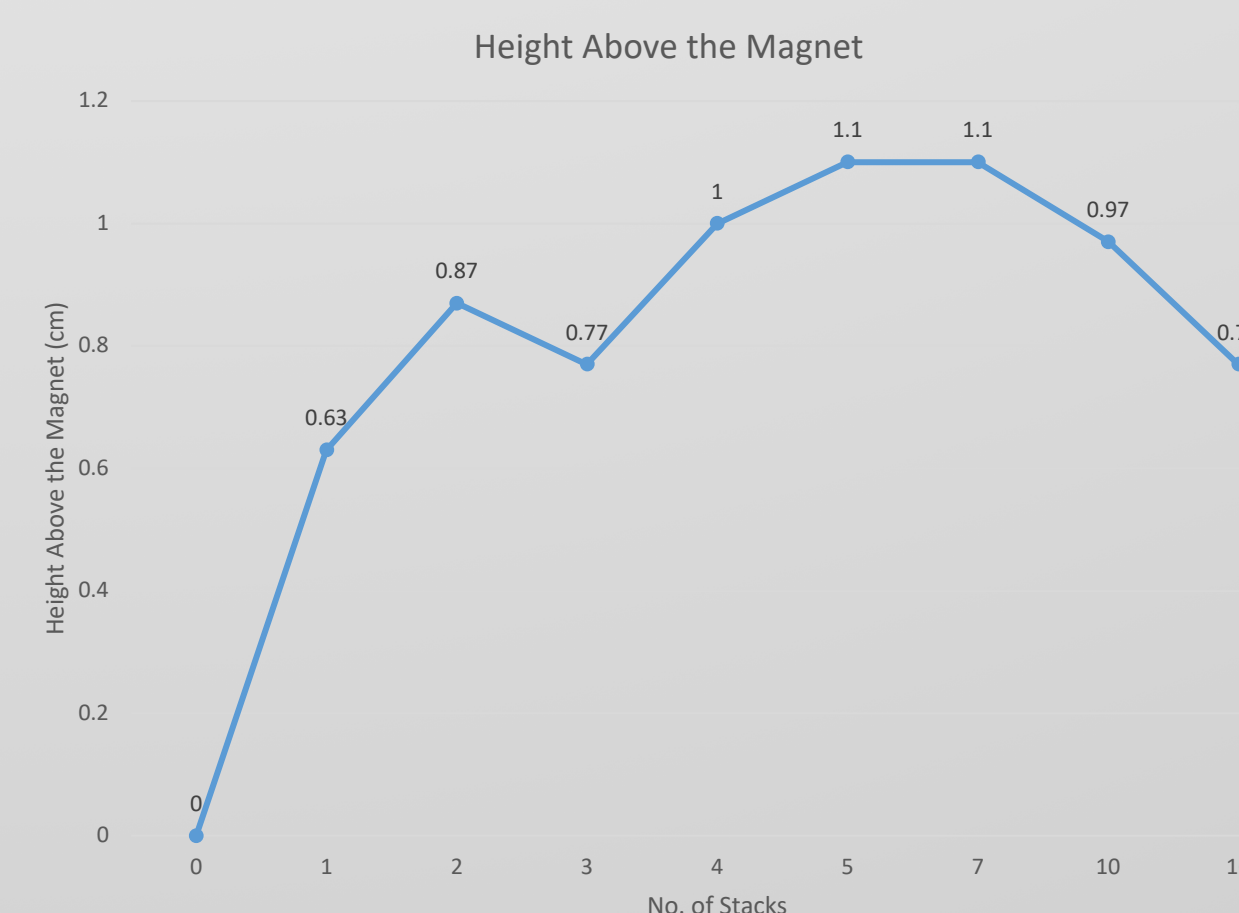


FIGURE 1.2 EFFECTS OF MAGNETIC FIELD STRENGTH ON SUPERCONDUCTOR

Discussion

When testing the magnetic field strength of the magnets, we found out as we increased the number of magnets, the magnetic field strength increased to a point where the field strength remained stationary. And when testing the height, the superconductor levitated above the magnet, the results showed that the height above the magnet increased, however, there were many errors.

Errors:

Systematic Errors

- Scale error – The magnetometer evidently only had the capacity to measure up to 3 stacks.

Random Errors

- Parallax error – When a ruler was used to measure the height of levitation with respect to the track.
- Errors arising from the environment – Temperature of the superconductor while it is active since the time it was being cooled for was not constant.
- Reaction time – Measuring the height of levitation took time which was unaccounted.

To avoid these errors and improve the method of the experiment, we could have set a specific time in which the superconductor remained in the liquid nitrogen so that all trials was affected the same way by the liquid nitrogen as other trials. Another improvement we could have done to our experiment is recording the experiment on a 90 degree angle. By doing so, we could have measured the results by looking at the video of the experiment. This way, we could have measured the height above the magnet more accurately and avoided the parallax error.

Conclusion

With our investigation, we are becoming one step closer to discovering new advanced technologies. The aim of this experiment was to observe the effects of the magnetic strength on a type 2 conductor's ability to levitate. The aim was achieved as we were able to see how the superconductor reacted when presented with a greater magnetic strength. The results of the experiment show that by increasing the magnetic strength, the height that the superconductor levitates above the magnet increases; thereby confirming the hypothesis to be positive up to a certain extent since errors may have negatively skewed the data. Based on this experiment future implications of superconductors can be more reliable since the requirements for levitation were explored at a greater depth.

References

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