



LUND
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DEPARTMENT OF PHYSICS

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A chase after the wind

A POPULAR SCIENCE PAPER BASED ON THE THESIS 'SEARCHES FOR
DARK SECTOR PARTICLES WITH THE ATLAS DETECTOR'

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Before Hans Lippershey, Galileo Galilei and Isaac Newton, humanity would look into space, stare at the stars and often think of heavenly bodies to revolve around Earth. With cosmological observations, after the invention and pioneering of telescopes by the aforementioned names, we discovered the Earth is in fact, just one of the many planets orbiting around a star we call our Sun. After that, we discovered that the Sun is just one of the many stars that can be found within our galaxy; which was followed up by the discovery of multiple galaxies.

By extension, if one was to make a similar analogy using the matter that we interact with within our daily lives, there might be matter that makes up the universe in which we exist in and yet cannot see or detect using the technology we currently possess. An example of such matter is Dark Matter[1] and, for scientists, its detection has been akin to chasing after the wind for a number of years due to its characteristics.

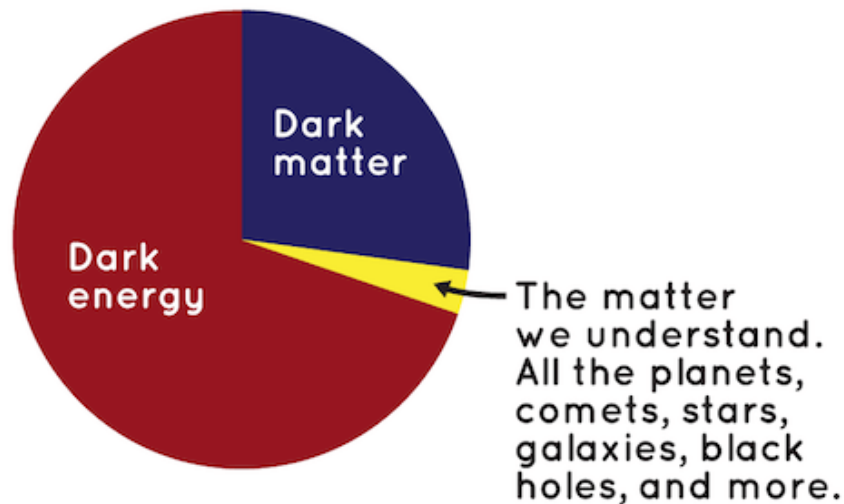


Figure 1: A depiction of the visible matter and Dark mass-energy distribution[2] within the cosmos.

Now, you might be wondering; how best have we tried to detect these particles? Well, most of the study within particle physics is done via analysing data using computers. The analysis is done at Particle Physics research centres such as ATLAS[3]. Detecting these particles could lead to a whole new understanding of how the universe evolved from its early stages and could revolutionise theoretical physics to a great degree the same way the discovery of the Higgs boson[4] confirmed theories on the existence of such a particle.

What the thesis titled 'Searches for dark sector particles with the ATLAS detector' attempted to do was to understand methods used in the aforementioned data analysis as well as how signals of these Dark Matter particles may look like. This was done with the hope that a contribution will be made towards Dark Matter research in the future after understanding the aforementioned methods.

References

- [1] Hitoshi Murayama. Physics Beyond The Standard Model And Dark Matter, April 2007. URL <https://arxiv.org/pdf/0704.2276v1.pdf>.
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