

INTRODUCTION

My research paper and research was focused on the theoretical physics of exotic matter and wormholes. Wormholes are theoretical astronomical structures that can possibly contribute to human and object space travel, as seen in movies like *Star Wars* and *Guardians of the Galaxy*, and even mentioned in *Stranger Things*. In general relativity, is exotic matter required to sustain traversable wormholes, and how does this compare with wormhole solutions in modified theories of gravity? Wormholes are made up of black holes, which suck people in, and white holes, which theoretically and shoot people away from them [1]. The combination of the two, plus the theoretical addition to exotic matter, a form of negative and dark matter, can create a structured wormhole. The purpose of this paper is to explore wormholes and provide more in-depth information to hopefully help other scientists to understand wormholes for future research.

METHODS

I started my research by trying to understand how wormholes are formed. I spent a lot of time researching and understanding how they worked and how they could theoretically be possible. Once finished with researching mainly about wormholes, I researched the components to create one. I looked into black holes and white holes, mainly for their differences and importance in wormholes. After I finished doing my research, I wrote a few drafts of my paper, only to realize I did not completely understand how exotic matter worked, so I began getting more in-depth to what exotic matter was and how it assisted wormholes. I spent lots of time researching and comparing articles to get my research question answered.

RESULTS

After doing lots of research, it's been apparent that wormholes are theoretical. The facts collected during research include many interesting themes to help understanding wormholes. Here are a few that stood out to me in my research:

1. Wormholes can be traversable, able to pass through more than once, and non - transversable, only able to pass through one way [2].
 - a. We can turn non - transversable wormholes traversable with the addition of exotic matter
2. Exotic matter is a form of negative and dark matter, which is also theoretical. It helps keep wormholes from collapsing completely, because wormholes are extremely unstable [3].
3. Cosmic string theory could be theoretically true, especially considering that wormholes could be galaxies apart from each other, and there could be many other wormholes tangled in a big string of other wormholes [4].
4. General relativity allows the mathematics and physics of wormholes to be true, and even possible to go through.
 - a. We can find solutions from wormholes through Einstein-Rosen Bridge equations, which are one of the general relativity equations.[6]

Wormholes are all theoretically, with proven aspects to it. It was very interesting to study, and there are many more facts in my paper that help understand how they work.



DISCUSSION

While writing my paper, I compared the research I collected with research done by other scientists and took note of the differences and similarities in the research. I tried to keep my research close to research done by other scientists. The research I collected agrees with my hypothesis and answers my research question in some detail. It explains that exotic matter is important to keep wormholes open and traversable, which answers positively to my research question.

CONCLUSION

In conclusion, Exotic matter is important to wormholes and can keep them open for theoretical human and object space travel, and general relativity permits wormholes to exist, thanks to the Einstein-Rosen Bridge equation. Exotic matter also helps differentiate transversable and non-transversable wormholes for research and even just for enjoyment. Wormholes are made up of both white holes and black holes, with the exotic matter in the middle keeping them from collapsing, because wormholes are extremely unstable. Wormholes are also a big deal for cosmic string theory, because the openings of said wormholes could be galaxies apart, and the paths could be tangled into a big mess of cosmic string. Learning about wormholes can help with string theory study, and possibly assist with the discovery of one. I hope that my paper can help young students and researchers who want to learn more about theoretical physics and wormholes, and possibly learn how to make or find one in the near future.

REFERENCES

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