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# Essays on Black Holes and Universe

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## Abstract

**The paper is focused on the Universe's expansion, its evolution over the time from the Big Bang, and how black holes have evolved, its presence in the universe, analysis of dark matter and its interaction. I have used the laws of Quantum Physics in order to explain the activity of black holes and the term extragalactic refers to studies related outside of Milky Way Galaxy and objects concerning it. The studies of extragalactic astronomy has an impact on how the universe was, is and how it will be.**

***Keywords:* *Extra-galactic region; Dark matter; Dark region; Stellar astronomy; Antigravity; Baryonic matter; Relic radiation***

## Introduction

Humans have always wondered, what is like exploring the outer space? What it feels to be inside a black hole. These are some modern questions astronomers are thinking of and are still being studied. Modern astronomy has been focusing on the nuclear and the stellar aspects of the astronomical bodies. This paper aims to present a researcher's view of the subject of theoretical astrophysics.

## Extragalactic Astronomy

Extragalactic astronomy refers to the region and objects present beyond the local group. The local group is the galaxy group containing the milky way. It includes supernovae remnants, stellar associations. Most of the observable universe that we have discovered belongs to this region. All the constellations that we have seen and discovered come from local group. The space beyond the region comes under extragalactic region. This region contains many sub-regions like Hubble Deep Field, LIGO, Chandra Deep Field South. Approximately 65% of dark matter is present in the extragalactic region. This dark matter is responsible for its gravitational potential effects on the cosmic microwave background. The rays emitted from cosmic microwave background effects the ordinary matter. The radiation is actually the remnant radiation from the beginning of the universe also known as the relic radiation. By taking the studies related to history of the universe, one can trace its history and its evolution. This can found out by studying the effects of cosmological waves on ordinary energy and matter [1].

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According to a new study, the dark matter doesn't coalesce to form an evenly normal matter or baryonic matter. According to Rutgers University Astrophysics Professor Matthew R. Buckley this phenomenon is due to lack of cooling mechanism. But if we try to apply the laws of quantum mechanics and quantum physics, we could get the answer as "when two nuclei combine, we get one star and the remaining energy which is utilised by the black hole. Here, star represents the combining of stars in positive combination, whereas the remaining energy is sent out in to the space where it may-be absorbed by any black hole." The Energy that is absorbed is utilised inside the black hole for its purposes.

To support this theory, let's say we have a nuclear reaction in the dark matter region. One nucleus collides head-on with the other nucleus and nuclear fusion takes place. The outcome of this reaction is that we get one star and the rest of the energy is absorbed by a black hole present near-by. This energy is utilised by the black hole for its purposes [2].

## Stellar Astronomy

Stellar astronomy generally refers to the study of stars and star systems. Even our black holes are formed from the star systems. That is they follow the Chandrasekhar limit. It says that any star in its white dwarf stage f it has the mass equals to 1.4 times the mass of Sun, and then it has chances of becoming a black hole.

With this knowledge that we have in our hand we try to understand their presence in the dark matter. Whenever a white dwarf star is present then on applying the Chandrasekhar's limit we try to get the probability of turning it into a black hole. If the mass is 1.4 times the mass of sun, then the chances are high, else vice-versa. Now, the universe is comprised of 27% of dark matter and 68% of dark energy. The fact that should be noted here is that dark matter produces attractive force whereas dark energy produces repulsive force. It is also known as Antigravity. Black holes are generally known to be highly attractive in nature. So we can assume that dark matter contains black holes. But if it is the case that dark matter is only concentrated to only a particular region, then, it may generate huge attractive force large in magnitude enough to pull anything in its way. In that case it might be equivalent to a black hole. A black hole is formed when a star is consumed by itself. That is, the star undergoes nuclear fission reaction where it is disintegrated into smaller substances. These smaller substances may not be termed as baryonic matter. So, through this we can conclude that formation of black hole is nothing but a continuous process of generating dark matter which can absorb anything, including light. This proves that black holes are constituted of dark matter. This statement can be used to prove the black hole's extreme gravitational pull. When the micro-sub-atomic matter tends to attract its surrounding particles. This generates heavy gravitational pull towards itself. Moreover, the black holes are only formed in selected regions in space and not all over. To be specific, the space is mainly comprised of positive radiation emitted by dark energy and negative radiation emitted by dark matter coming from black holes. This dark energy and dark matter do cancel each other but since dark energy dominates the space by over 60% of the universe's volume we seem to have more amount of positive radiation from the space. The final conclusion is that, the extreme gravitational pull of the black hole is due to dark matter [3].

### Findings

Through my research, I have found out the following observations:

1. Black holes when they are formed, they are comprised of dark matter
2. Black holes tend to absorb the residual energy during a nuclear reaction in the outer space

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