January 2024

Life Beyond the Horizon: The Universe Was Born in a Black Hole

Zahria Patrick
zzpdbr@umsystem.edu

Life Beyond the Horizon: The Universe Was Born in a Black Hole

Zahria Patrick, Advisor: Rob Wilson, Ph.D.

Introduction & Background

Based on what is already known about black holes, it is impossible to travel beyond the event horizon of one without being stretched past the body's limits. However, a hypothesis made by a few physicists, including theoretical physicist Nikodem Poplawski, suggests that the universe may have been born in a black hole. If this is true, it would change everything physicists know about life in black holes, the contents of space, and the origins of life itself.

What is A Black Hole?

Black holes...

- Are large galactic bodies in space with a gravitational pull strong enough to capture light particles
- Are born from the death and collapse of stars (supernovae)
- Are invisible to the naked eye

A headshot of theoretical physicist Nikodem Poplawski.

Rethinking the Big Bang

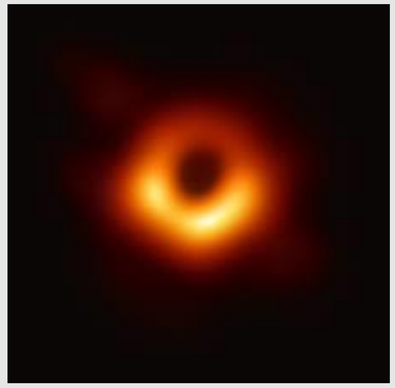
With the introduction of this theory, scientists would have to rethink what they know about the origins of space, or in other words, rethink The Big Bang Theory…

- The Big Bang Theory was proposed by George Lemaitres and states that the universe started as a single particle and then rapidly expanded
- It answered many questions for scientists and confirmed some of their predictions about space
- Despite these wonderful discoveries, the theory left many other important questions unanswered
- Nikodem Poplawski, along with many other physicists and scientists, believes that black holes could be the key to finding the answers to these questions

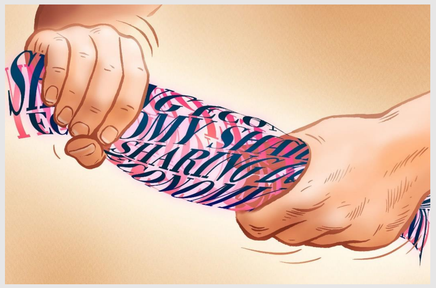
Evidence & Counterarguments

Dark Energy and Dark Matter

- Dark matter and dark energy make up most of the contents in space, but they remain a big mystery to many physicists
- Both could have come from black holes proving that there may be a connection between black holes and the birth of the universe
- Dark matter has a specific set of characteristics that primordial black holes would have also possessed
- Dark energy could have come from torsion present around black holes



A photo of the black hole located at the center of the Messier 87 (M87) Galaxy captured by NASA.



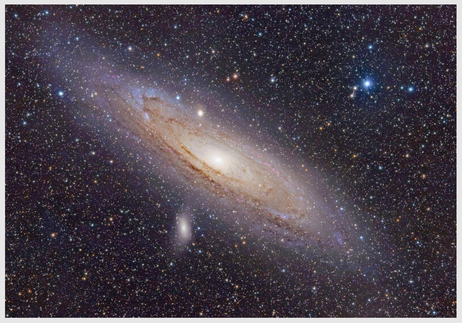
A visual representation of torsion or the twisting/bending of an object.

Torsion

- Torsion is the bending and twisting of an object
- Spacetime torsion is similar but applies solely to black holes and refers to the bending of spacetime that occurs around them
- The direction in which torsion bends time around black holes could be the reason why time in this universe moves in one direction
- Torsion could have stopped the collapsing of star matter that makes black holes causing a "Big Bounce" which could be the cause of the universe's rapid expansion

Research Findings

- One major flaw in this theory is that many aspects of it can't be experimentally determined to be true
- It is currently not possible to get near a black hole and gather physical samples of it
- This leads to critics questioning the credibility of the theory
- Some people also believe this isn't a theory at all



This photo shows the Milky Way Galaxy whose center contains the black hole Sagittarius A.

Fun Fact:

- The black hole located in the middle of the Milky Way Galaxy is a supermassive black hole called Sagittarius A.

Final Thoughts & Conclusion

There are many arguments made supporting the idea that the universe exists in a black hole:

- Dark matter present in the universe and primordial black holes could share the same characteristics
- Dark energy also present in the universe could be the result of torsion around a black hole
- Torsion would have stopped the collapsing of star matter in black holes by snapping back and causing a "Big Bounce" which would explain the universe's rapid expansion
- The direction in which time moves in this universe could be the result of the direction in which torsion bends spacetime around a black hole
- There is no way to gather physical data to test this theory

References

- Avi Shporer, "'Deeply Compelling' – Weird Existence of Primordial Black Holes in the Early Universe," "Deeply Compelling" -Weird Existence of Primordial Black Holes in the Early Universe - The Daily Galaxy
- "Every Black Hole Contains a New Universe," Every Black Hole Contains a New Universe | Inside Science
- Heather R. Smith, "What is a Black Hole," What is a Black Hole? | National Aeronautics and Space Association
- Steven Soter and Neil deGrasse Tyson, "Georges Lemaitre, Father of the Big Bang," Georges Lemaitre, Father of the Big Bang | American Museum of Natural History

UMSL Honors College
University of Missouri–St. Louis