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Notes- how should I refer to my/our/the team’s research as a pronoun

**Abstract**:

Currently, the big bang theory is recognized as the predominant explanation for the origin of our universe. This theory claims that the universe started as extremely hot and dense, and subsequently experienced a period of rapid expansion known as inflation. The big bang theory is corroborated by observational data collected from the cosmic microwave background (CMB). The CMB is figuratively a sort of footprint composed of radiation from the early universe. However, the big bang theory does not explain why the universe expanded uniformly. The inflation theory was consequently introduced. The theory proposed that the rapid and symmetric expansion of the early universe explained why the universe still appears so uniform. The CMB data strongly supported this theory.

Likewise, the big bang theory is missing another crucial detail. The theory predicts that the universe started from a point of infinite density. This prediction does not make physical sense and therefore exposes our lack of understanding of the the origin of our universe. On top of that scientists included hypothetical types of matter which have never been observed, into their theory in order to match observational data of the temperature of the universe. This problem has not been answered up to this point in time.

\*discuss quantum particle production and quantum angular momentum\*

**Introduction**: My group’s research begins where others has left off: determining what occurred at the moment the universe was created. To evaluate this question my group began our research in the time before our universe- a black hole. According to BHC, when matter collapses into a black hole is collapses until it eventually reaches a density where the matter inside of the black hole is forced into a new region of space. When this occurs a new universe is formed. BHC, in fact, is simpler than the inflation theory (i.e. does not require hypothetical matter) while still explaining why the universe formed the way it did.

**Methods**: I programed everything on a computer running Windows 7, using the language Fortran 77, and the IDE MS Visual Studio. I also compiled and ran the program through command prompt. The data was graphed through gnuplot. Reference appendix 1 for the equations of Dr. Poplawski’s theoretical framework for BHC. Reference appendix 2 for the code of the computer program.

My first step was making sure all necessary files and programs were downloaded. After doing so I created a file is MS Visual Studio called “universe.f” and began by declaring the program name in line 1 and implicit double precision (a-h,o-z) in line 2. I chose to use implicit double precision because it allows me to easily control the precision of my variables and constants by adding either a-h or o-z to the front.

I then declared my variables and constants. The program asks the user to input an initial black hole size, quantum particle production coefficient, and delta time. These three factors are also stored as variables. The program then begins a function which collects and exports the data from each iteration of the proceeding do-loop to a notepad file. This data will later be imported into gnuplot to be graphed. Inside of the do-loop the program starts by checking if the user’s inputs create any extremes that could cause errors. If everything is alright then the program begins calculating the change in size of the universe over size. As the density of the virtual black hole approaches a certain value

**Results**:

**Discussion**:

**Acknowledgments**:

**Appendices**:

Appendix 1- formulas

Appendix 2- code

ADDED CONTENT

When a black hole reaches a density around the order of magnitude of 10^57 kg/m^3 torsion produces a repulsive force which inhibits further collapsing of the black hole and, in fact, cause the black hole to temporarily expand

The research began with Dr. Poplawski’s theoretical framework of BHC. My goal was to translate this theoretical framework into a computer program. The computer program would iteratively solve the equations of this theoretical framework and output the characteristics of the black hole’s child universe.