CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J1907

Project Title
Across the Universe

Abstract

Objectives/Goals
The objective of this scientific investigation is to calculate the constant velocity at which a person in a spaceship would have to travel to get from earth to the edge of the portion of the universe visible from Earth, which is about 13.7 billion light years.

Methods/Materials
In this project I used a pencil, paper, a scientific calculator, and a textbook on Astronomy titled "The Cosmic Perspective". I applied the time dilation formula of special relativity which I found in the textbook mentioned above, to calculate how fast one would have to go to travel 13.7 billion light years in what they perceived to be one day in their relative time. This is the distance from Earth to the edge of Earths visible universe, which is the portion of the universe that an observer on Earth could possibly observe.

Results
My results were that to travel 13.7 billion light years in one day, you would have to go at aproximately the square root of (1- 10^-26)multiplied by the speed of light. I keep this number in radical form, because the number under the radical sign is very close to 1, and seeing as the square root of 1 is 1, the square root of a number that is close to 1 is going to be even closer to 1, so it is more convinient to leave the number in radical form.

Conclusions/Discussion
This demonstration shows how even though for massive objects it is not possible to go the speed of light or faster, it is possible to travel great distances in very short amounts of time. This is because as an object travels at a faster and faster pace, its relative passage of time becomes slower compared to the passage of time of an object that is not moving, and so therefore can travel across distances that are great in short amounts of time. This is in effect a form of non-instantaneous time travel. For example, in this project a person could travel a distance in what the traveler would perceive to be one day, but the rest of the universe would think it took 13.7 billion years, so you are aging one day in 13.7 billion years! The only drawback of this time travel is the fact that you could not go back, so, if you were to go to the edge of Earths visible universe and back in what you think is two days, you would see the earth and all the people on it as aged 27.4 billion years, so everyone you know, and the civilization you know would be long gone.

Summary Statement
For my project, I determined how fast you would have to go to travel from Earth to the egde of Earth's visible universe (which is a13.7 billion light year distance) in one day.

Help Received
My dad checked my calculations to make sure I hadn't made any mistakes, and he checked my grammer and spelling on this project.