PH508 Issues in Apologetics

Dr. William Dyrness: Summer 1994

Critical Book Review:

Stephen Hawking

A Brief History of Time

From the Big Bang to Black Holes

by

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1. Content

This book is an introductory one to the subject of the Big Bang and Quantum Mechanics and the influence on our general concept of time. It is also concerned with the question of God. Is there the necessity of a God creating the world?

1.1. Our Picture of the Universe

Hawking here surveys how our picture of the universe has developed in the history of our cultures. The ancient Greeks believed in an eternal static universe. The Jews and Christian tradition believed in a creation around 5000 BC. by the "First Cause" which is God. An interesting feature is that even Augustine believed that time did not exist before the creation of the universe.
The high point in early cosmology was reached by Isaac Newton who first introduced a system to describe the movements of celestial bodies. Yet Newton was not entirely accurate and his work -- as all scientific theory -- was subject to further scientific refining. This refining was done by Einstein's Theories of Relativity. Contemporary scientist use the Theory of Relativity and Quantum Mechanics to describe the Universe and look forward to develop a **Unifying Theory** to describe the whole universe.

1.2. Space and Time

The consequences of the Theory of Relativity are introduced in this chapter. The speed of light is the only constant. Time and Space are relative to this absolute, meaning that different observers do have different notions of both when viewing the same events. A consequence of Relativity is that the knowledge of an event can only travel with the speed of light making it impossible to know what happens in different location at the same time.

1.3. The Expanding Universe

The theories of Friedmann predicted an expanding universe. These were confirmed later by Red Shifts in the spectral colors of stars analyzed by Hubble. These Red Shifts show a speed of the common celestial objects moving away from us, thereby suggesting that the universe is expanding. This in turn is the indication that the universe must have had a beginning in one point in the past.

1.4. The Uncertainty Principle

Quantum Mechanics is introduced here with the concept of Uncertainty as established by Heisenberg. Uncertainty makes it impossible to know the exact location and speed of any sufficiently small subatomic particle. Therefore one has to work with chances on this level dealing a death blow to scientific determinism. Quantum Mechanics describe basic elements of matter as having a dual nature in sometimes behaving as a participle and sometimes as a wave.

1.5. Elementary Particles and the Forces of Nature

The characteristics of the basic elements of matter known to us are surveyed here. Properties of the participles are expressed by spin, color etc. The properties highlight certain ways these particles can interact with each other and form different kinds of forces (wave) or particles. Four forces between these particles are discerned: Gravity, Electromagnetic Force, Weak Nuclear and Strong Nuclear Force.

1.6. Black Holes

The concept of Black Holes is known since the late sixties and refers to stars that have collapsed under their own weight. As a result the gravitational pulse is so strong that even light cannot escape from a black hole.

1.7. Black Holes Ain't so Black

Black Holes should not be detectable since their gravitational pull even bends light back. Yet at the event horizon (distance from black hole at which light cannot escape anymore) quantum fluctuations cause a radiation that can be measured.

1.8. The Origin and Fate of the Universe

Various theories of how the development of the universe in the Big Bang progressed are discussed. Einstein's Theory of Relativity leads of necessity to a beginning of the universe in a singularity. The universe is remarkably ideally suited for human life (**Antrophic Principle**). This could be taken evidence for a divine creator. That the universe is created only for us is hard to believe and so other theories like an oscillating universe etc. are offered that have more the elements of "chance" and selection. Hawking finally offers a theory of a closed surface of a finite universe to avoid having finite time. The universe is self-contained after all and has no need for a creator.

1.9. The Arrow of Time

Passing time is usually leading to an increase in **Entropy** (Disorder, Chaos). This increase in **Entropy** is necessary for our daily life. Since Einstein it is known that there is no absolute universal time but that time is dependent on the movement and position of the observer. Hawking surveys different kinds of time and speculates about progressing and receding time to ultimately construct a universe without the necessity of a beginning in time in itself.

1.10. The Unification of Physics

Contemporary science has so far failed to come up with a comprehensive theory of the universe. Hawking surveys different approaches to solve this problem with a "String Theory" and a multidimensional world to overcome difficulties experienced so far by science.
Science needs a unified theory of the universe to make it possible to predict events and control the events of our universe. Hawking expects this great theory in the lifetime of this generation.

1.11. Conclusion

God has no freedom in creating the universe since the universe is without bounds and of necessity the way it is. The universe might be self-consistent and that also of necessity. The unified theory should explain all of that and finally allow us to know the "mind of God" (whatever the meaning).

2. Stephen Hawking's view of God and Creation

Stephen Hawking is the most well known and respected cosmologist of our time. He has contributed significantly to our understanding of the Big Bang theory by integrating Quantum Mechanics. His work concerning Black Holes and the Big Bang theory as a

reversal of the development of Black Holes set a milestone for Science. Almost every scientist now holds that the world began with the Big Bang[1].
Since Hawking is mainstream and universally accepted, he has to propagate commonly held beliefs in society at large.

2.1. God

Hawking sees no necessity of having a God. The universe could be basically self-contained and not affected by anything outside of it[2]. Time and Space might form a closed surface and be endless after all. There might be no need for a beginning and an end.
If God created the world then he did not have much choice, otherwise nothing would have come into being. If there is a God then it is the God who started it all. Then he left us alone[3]. The question that is there for us to solve is how did he leave it to us? How does it work. If we would know the initial state of the world then we would have complete control over its future.
Only God would be able to see the universe as it operates. For him the universe would be deterministic since he could see the world without interfering with it. The uncertainty principle would not be valid for him[4].
God cannot intervene in the world. If we is all powerful and all knowing then he would have foreseen. God should have known what he created and therefore does not have to intervene[5].

2.2. Creation

Contemporary Science asserts that there was no time before the universe began[6]. Time of necessity stops with an infinite mass such as present in a black hole or the Big Bang before it banged.
All the parameters of this world are finely adjusted to make our existence possible[7]. The tuning could be interpreted as a sign for a divine purpose but could also be seen as natural selection out of an endless amount of available universes.
The idea that the universe was just created for us is very offensive to Hawking[8]. Why do other Galaxies exist then? Why not only our solar system?

2.3. Science

Science is ever refining itself. Theories can never be proven and results that contradict a theory are the end of that theory[9]. Yet Hawking hopes for the **Unified Theory** to explain the world and give humans final control over events of this world. He longs for an understanding of the creator. Knowledge and mastering of this universe will give us the solution and allow us to read the mind of God.

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[1] p. 50
[2] p. 136
[3] p. 122
[4] p. 55
[5] p. 166
[6] p. 46 p.50 Hawking did work to prove that this follows from Einstein's Theory of Relativity
[7] p. 125
[8] p. 126
[9] p. 10

3. Critique of Hawking's view

Hawking does cling to the old Greek and Newtonian approach to the world. He still wants to have an eternal universe even within the parameters of contemporary knowledge of a universe with a beginning.

The first part of his book is largely concerned with the facts as established by Science in the Theory of Relativity and Quantum Mechanics. In the later parts Hawking begins to speculate wildly and attempts to restore the Newtonian deterministic worldview. Although he has expressed before that Quantum Mechanics abolishes determinism and only allows chances for the outcome of an observation[10] he still hopes for the Grand **Unified Theory** that would save him from this horrible conclusion and allow humans total control of their environment. There is an illusionary almost messianic clinging to Newtonian deterministic ideals in his future expectations. Knowledge will save us and it will come soon, "within the lifetime of some of us around today"[11]. There is a strong religious zeal evident for this worldview.

Hawking consistently denies God, especially the God that could intervene in reality and wants to go back to the old and safe concept of an eternal universe and the unmoved mover. His knowledge of increasing Entropy[12] should tell him that there is a progression in the universe to an end. Instead he engages in baseless speculation about the nature of time in Chapter 9.

Hawking shows marks of avoiding the evident conclusion from contemporary science. The universe cannot have a beginning and the world must be controllable by us. There is a rebelliousness against dependency on some primitive God.

God has to be -- if he exists at all -- according to Hawking's strong opinions about God. That becomes evident in the concept that God cannot intervene since he should have know beforehand.

God cannot have created the whole universe just for us. Our Solar System would be sufficient. Why would he create more? The fact that he asks this question despite the evident "scientific" answers (which is in this case the need for the raw material for the Solar System!) gives rise to a lot of questions.

There is a pattern here of putting his own capacity to reason above everything else. Hawking is not ready to acknowledge his limits and his dependency.

[10] p. 55
[11] p.167
[12] p.102