

# **Physics and Faith 6.**

**Physics, the Fall, and the  
Final Things**

# Introduction

In first few sessions, we considered unexplained contingencies or boundaries in modern physics that can be considered as "rumors of God."

In last week's session, we considered ways in which modern physics might influence the theological doctrines on **Divine Action and Human Freedom**

Today, we consider ways in which modern physics might influence doctrines on:

- **The Fall and Original Sin**
- **The Last Things (Eschatology)**

# Eschatology

## Death by "Fire" or "Ice"

The universe has been expanding since the **Big Bang**. Gravity tends to slow the rate of expansion. An unknown repulsive (anti-gravity) force (the "cosmological constant," "dark energy") may be accelerating the expansion. There are two possible futures for the universe:

- **Gravity wins**; universe contracts into the Big Crunch. Death by "fire" ("heat" death)
- **Expansion wins**; universe expands forever. Death by "ice" ("freezing" death)

# Eschatology

## Death by "Fire" or "Ice"

### Death by "fire" (The "Big Crunch")

- It has been suggested that in a death by "fire", the universe could rebound, resulting in a new expansion
- whether the resultant "reborn" universe would be viable is questionable however because it would be starting out with the *very large entropy* of the old universe

# Eschatology

## The Tyranny of Entropy

**Entropy** is a measure of the probability a system will be in a certain state

- **low** entropy -- system is in a very *unlikely* state

- **high** entropy -- system is in a very *likely* state

The **Second Law of Thermodynamics**:

- the *total* entropy of a “closed” system *increases* continuously

# Eschatology

## The Tyranny of Entropy

### Entropy and the Arrow of Time

The tendency of **entropy** to *increase* (the **Second Law of Thermodynamics**) has a particular deep and mysterious significance because it seems to have a connection with the "**arrow of time**"

# Eschatology

## The Tyranny of Entropy

### Entropy and the Arrow of Time

- A major unsolved problem in physics is why there is a preferred direction to time. Almost all the laws of nature are symmetric with respect to the direction of time. That is, physical laws do not seem to “recognize” a direction to time.
- Phenomena where direction of time important:
  - Psychological time
  - Increase in entropy
  - Expansion of the Universe
  - Time asymmetry in the decay of the kaon (**K<sup>0</sup>**) meson into pion mesons

# Eschatology

## The Tyranny of Entropy

Increasing entropy is associated with  
*increasing disorder and randomness.*

However, much of the structure in the universe (stars, galaxies, the human body) are systems in which matter is in a very *unlikely* state of order and arrangement, that is, of very *low* entropy

# Eschatology

## The Tyranny of Entropy

Whether the universe suffers a "death by fire" or a "death by ice", the **total entropy** of the universe will be **much greater** at its death

The possibility a reborn universe after a "death by fire" would be able to form new structures of *very low entropy* (very unlikely arrangements of matter such as galaxies, stars) would be much lower than the previous universe -- perhaps impossible

# Eschatology

## Death by Fire

### Gravity Wins -- the Big Crunch

- Universe contracts. Background radiation temperature increases
- Galaxies collide, high velocity stars fly out
- Stars destroyed by
  - evaporation by high temperature background radiation
  - collisions with other stars
- A diffuse high temperature gas fills the universe from evaporation of stars

# Eschatology

## Death by Fire

### Gravity Wins -- the Big Crunch

- Temperature becomes so high that atoms and then nuclei dissociate into elementary particles, which in turn dissociate into photons and a quark-gluon plasma
- Finally a "Big Crunch" with a possible rebound and new expansion into a universe that is sterile because of its *high starting entropy*

# Eschatology

## Death by Ice

### Expansion Wins. The universe expands "forever"

- All stars become white dwarfs, neutron stars, or black holes; eventually become dead bodies or radiate away
- Planetary systems disrupted by tidal effects
- Galaxies disintegrate
- Temperature approaches absolute zero
- Elementary particles (including the proton by GUT) decay; the universe becomes a cold gas of photons and neutrinos

# Eschatology

## Implications for Theology

Physics: The Universe is doomed to futility

**Only within the scaffolding of these truths, only on the firm foundation of unyielding despair, can the soul's habitation henceforth be safely built**

- Bertrand Russell

Implications for any Theology:

- No hope for "evolutionary optimism"
- No hope for the "triumph of the kingdom of God simply through the flux of history"
- God of pantheism will die

# **Eschatology**

## **Implications for Theology**

Physics: The Universe is doomed to futility

**An ultimate hope will have to rest in an ultimate reality. . . in the eternal God himself and not in his creation**

**. . . we are driven back . . . to God alone as the basis of final hope, so that our own and the universe's destiny awaits a transforming act of divine redemption.**

-- John Polkinghorne

# Eschatology

## Polkinghorne's Eschatology

Theological problem of the futility of the universe (cosmic death) is similar to problem of the futility of our own lives (human death)

Hope for both is based on:

- faithfulness of God
- the "everlasting seriousness" with which God views God's creatures

# Eschatology

## Polkinghorne's Eschatology

God is a God of the living:

**And as for the dead being raised, have you not read in the book of Moses, in the story about the bush, how God said to him, "I am the God of Abraham, The God of Isaac, and the God of Jacob"? He is God not of the dead, but of the living. . .**

Jesus, talking to the Sadducees, in Mark  
12:26-27

# Eschatology

## Polkinghorne's Eschatology

Human beings are not dual entities  
consisting of:

- an "immortal soul" trapped in
- a corruptible body,

but a psychosomatic unity

- "soul:" **the almost infinitely complex, dynamic, information-bearing pattern, carried at any instant by the matter of my animated body and continuously developing throughout all the constituent changes of my bodily make-up during the course of my earthly life"**

# Eschatology

## Polkinghorne's Eschatology

At death the psychosomatic unity is dissolved, but the "soul," that pattern of ourselves, is remembered by God, who will again instantiate each of us in the new heaven and earth (our "resurrection")

The idea of human beings as *psychosomatic unities* implies that **embodiment** is fundamental to true humanity. Our hope is a **resurrection of the body** in a world to come

- crude analogy: the "software" of ourselves running on the "hardware" of this world will be transferred to the "hardware" of the world to come

# **Eschatology**

## **Polkinghorne's Eschatology**

Where will the new "hardware" come from?

**Surely the "matter" of the world to come must be the transformed matter of this world. God will no more abandon the universe than he will abandon us. . .**

**The resurrection of Jesus is the beginning within history of a process whose fulfillment lies beyond history, in which the destiny of humanity and the destiny of the universe are together to find their fulfillment in a liberation from decay and futility (cf Rom 8:18-25)**

- John Polkinghorne

# Eschatology

## Polkinghorne's Eschatology

### The Old Creation

was a creation out of nothing (*creatio ex nihilo*)

**the old creation is God's bringing into being a universe which is free to exist 'on its own', in the ontological space made available to it by the divine kenotic act of allowing the existence of something wholly other. . .**

-- John Polkinghorne

# **Eschatology**

## **Polkinghorne's Eschatology**

### **The Old Creation**

**“the old creation has the character which is appropriate to an evolutionary universe, endowed with the ability through the shuffling explorations of its happenstance to ‘make itself’.”**

-- John Polkinghorne

# Eschatology

## Polkinghorne's Eschatology

### The New Creation

is a transformation of the present creation  
(*creatio ex vetere*), a divine redemption  
of the old creation

**The new creation represents the transformation of that [old] universe when it enters freely into a new and closer relationship with its Creator, so that it becomes a totally sacramental world, suffused with the divine presence**

-- John Polkinghorne

# **Eschatology**

## **Polkinghorne's Eschatology**

### **The New Creation**

**“Are we somehow to be freed from the tyranny of entropy, and is the universe to shine forever as the resplendent creature of God -- a new heaven and earth?”**

-- Robert John Russell

# Eschatology

The redemption of the cosmos in which a resurrected humanity will participate, is "both immensely thrilling and deeply mysterious. Yet its unimaginable future has a present anchorage in our hearts."  
(Polkinghorne)

The intuition of hope in human beings, that in the end all will be right, can be considered a "signal of transcendence"

# Eschatology

for a Christian, he or she:

**knows the present for what is it; that is to say, a point too charged with eternity to be understood except by myths which open a door into heaven and force upon every moment the terrible relevancy of the first things and the last, the elemental and the ultimate**

- John Robinson

# The Fall and Original Sin

Where Did Sinful Human Nature Come From?

*The Problem:*

- Human nature is weakened, corrupted, biased towards evil
- A good God who creates only that which is good could not have intended this. We are made in the *image of God*
- What happened?

# The Fall and Original Sin

The **classic explanation** for a sinful human nature is the idea of the "**Original Sin**":

- Adam and Eve, our first parents, sinned and lost the holiness God created them with. As consequence,
- future human beings inherited:
  - a corrupted human nature (It is impossible for us not to sin)
  - guilt for Adam's sin
- the universe changed:
  - *For the Woman*: Pain in childbirth increased. "Your desire will be for your husband. The man shall rule over you."
  - *For the Man*: increased agricultural difficulties
  - death, physical evils of disease, natural disasters entered the world

# The Fall and Original Sin

One Problem with the **classic explanation**:

Physics: the laws of physics have been  
fundamentally the same since the Big  
Bang

# The Fall and Original Sin

## A modern explanation (Polkinghorne):

- As our human ancestors evolved, there came a dawning of:
  - *self-consciousness* (lure of self)
  - *God-consciousness* (lure of the divine)
- there was a gradual turning away from *pole of the divine Other* to the *pole of human ego*
  - our ancestors became: "curved in upon themselves" (Luther)
  - we have inherited this cultural orientation to self and its accumulative consequences through history

# The Fall and Original Sin

## **A modern explanation (Polkinghorne)**

### *continued:*

- it was not death and physical suffering that literally entered the world, but rather the sad recognition of human finitude

# The Fall and Original Sin

**Self-consciousness, with its power to envisage the future, made our ancestors able to anticipate that, one day, they would die. At the same time, their increasing alienation from God cut them off from the only true source of hope for a destiny beyond death, thereby making the realization of human transience a bitter one**

- John Polkinghorne

# References

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## **Eschatology**

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