

In association with *Holy Trinity Anglican Church*

Raymond Historical Publications presents



# *Are We Alone in the Universe?*

*(Depends on the definition of Universe)*

## *“The Search for Spock” – Part II*

One in a series of historical perspectives  
on the Christian Church in America

Tom Raymond

November 20, 2016

Ver. 1.0

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# How did the Universe begin?

## How did life arise on Earth?

These are among mankind's most important questions throughout the ages

- **In the last century** we've learned more about science and the creation of the Universe than everything known before the 20th century.
- **In the last two decades** new discoveries have led to new theories that give us unique hypotheses about the nature of the Universe and the presence of God.

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# Presentation Overview

- PART I (last week)
  - Resources and Inspirations
  - Literary Choices: Fact and Fiction
  - Definitions; Scales for Reference
  - Components of our Universe(s)
  - **PART II (today)**
  - **Genesis**
  - **Contact**
  - **Souls**
  - **Q&A and Take Away**
-

# Resources

- Holy Scripture (KJV): Genesis, Job, Matthew, Revelation
- The Book of Common Prayer
- The literature and media, including:
  - ✓ ***Phenomenal Physics***, “A totally non-scary guide to physics and why it matters”, Isaac McPhee, 2016
  - ✓ ***The Physics of Star Trek***, Lawrence M. Krauss, 1995
  - ✓ ***How the Universe Works***  
SCI Channel, 2015-17  
Comcast Cable TV

# Recent inspirations for this work

- ❖ Passing comments from Fr. Brad
  - Bible college - cosmic string theory
  - Email ref. a planet and three moons – signs of liquid water, possible microbes!
- ❖ Richard Doster, religion columnist,  
Fernandina Beach News Leader
- ❖ 100th anniversary – 1916 – Einstein's theory of **General Relativity**, i.e. gravity and time
  - Proof positive beginning in 1919
  - Ref. also 1905, **Special Relativity**, i. e. the speed of light

# Other inspirations

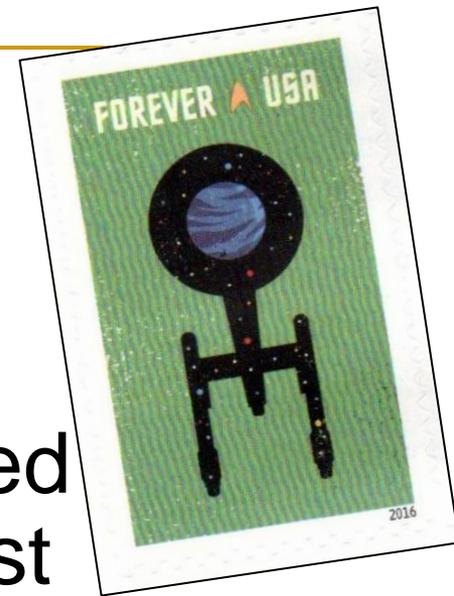
- ❖ Four recent **major scientific milestones** in humanity's view of the Universe
  - 1) 2012, **Higgs Boson** detected, long-theorized but elusive subatomic particle; explains how matter gains mass (not why)
  - 2) 2015, Voyager 1 (1977 launch) reached **interstellar space**; we escaped our Solar System!
  - 3) 2015 and 2016, **Gravitational waves** detected, long-theorized; the 4th force?
  - 4) August 2016, **Earthlike exoplanet** detected nearby (4.3 LY); first one inferred in 1995, > 3000. Analog: “moth next to a searchlight”

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❖ 50th Anniversary of *Star Trek*

# Sci-Fi out-takes

- Star Trek isn't just about stun guns, warp drives, beaming up.
- It's 50 years of story lines wrapped around the human spirit, the quest to reach beyond, to the stars or deep within, into the **human soul**, to fully embrace, appreciate (Job!), and nurture it.
- Stories of faith, hope and charity, of love as practiced through our Judeo-Christian tradition.
- The search for truth.



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# Book of Common Prayer

## BCP 1928

*I believe in one God the Father Almighty, Maker of heaven and earth. And of all things visible and invisible . . . .*

## BCP 1976 - Eucharistic Prayer C

God of all power, **Ruler of the Universe**, you are worthy of glory and praise.

*Glory to you for ever and ever.*

At your command all things came to be: **the vast expanse of interstellar space, galaxies, suns, the planets in their courses, and this fragile earth, our island home.**

*By your will they were created and have their being.*

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Playfully called the “Star Trek” canon

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# *Genesis*

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# *Two Genesis Stories*

*One of Faith*

*One of Physics*

## *In the Big Inning*

*Lions*            0 0 0 0 0 0 0 0 - 0

*Christians*    0 0 0 0 0 0 7 0  $\chi$  - 7

# “In the beginning ....”

The term holds several uses for us

- In faith

- ✓ **Gen 1:1** *In the beginning God created the heavens and the earth.*

- ✓ **John 1:1** *In the beginning was the Word, and the Word was with God, and the Word was God.*

- In science

- ✓ **Space:** Universe's starting point

- ✓ **Time:**  $T = 0$

# Let there be time, let there be light

*In the beginning God created the heavens and the earth. And the earth was without form, and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters. And God said,*

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \quad (1) \quad \nabla \cdot \mathbf{E} = 0 \quad (2)$$

$$\nabla \times \mathbf{B} = \mu_0 \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \quad (3) \quad \nabla \cdot \mathbf{B} = 0 \quad (4)$$

$$\nabla \times (\nabla \times \mathbf{E}) = -\frac{\partial (\nabla \times \mathbf{B})}{\partial t} = -\mu_0 \epsilon_0 \frac{\partial^2 \mathbf{E}}{\partial t^2} \quad \nabla^2 \mathbf{E} = \mu_0 \epsilon_0 \frac{\partial^2 \mathbf{E}}{\partial t^2}$$

$$\frac{\partial^2 \mathbf{E}}{\partial x^2} = \mu_0 \epsilon_0 \frac{\partial^2 \mathbf{E}}{\partial t^2} \quad \mathbf{E} = E_0 \sin\left(2\pi \frac{x - vt}{\lambda}\right) \quad v^2 = \frac{1}{\mu_0 \epsilon_0}$$

$$\frac{\partial^2 \mathbf{E}}{\partial x^2} = -E_0 \left(\frac{2\pi}{\lambda}\right)^2 \sin\left(2\pi \frac{x - vt}{\lambda}\right) \quad \frac{\partial^2 \mathbf{E}}{\partial t^2} = -E_0 \left(\frac{2\pi v}{\lambda}\right)^2 \sin\left(2\pi \frac{x - vt}{\lambda}\right)$$

*And there was light.*

**NOTE 5**

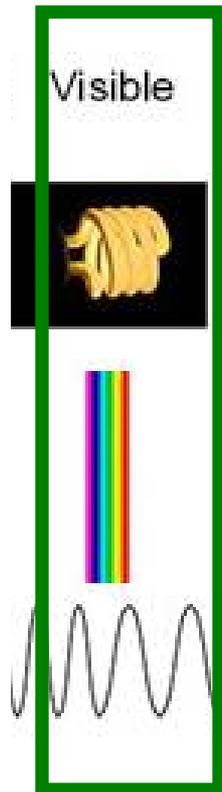
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## NOTE 5

*If physics ,through its muscle and grit, is the fatherly force behind the universe, then mathematics is its mother, wrapped in all her veils and layers of elegance and grace.*

# Early Human Optics – EM Spectrum

This is what the elders and scribes of Holy Scripture had to work with

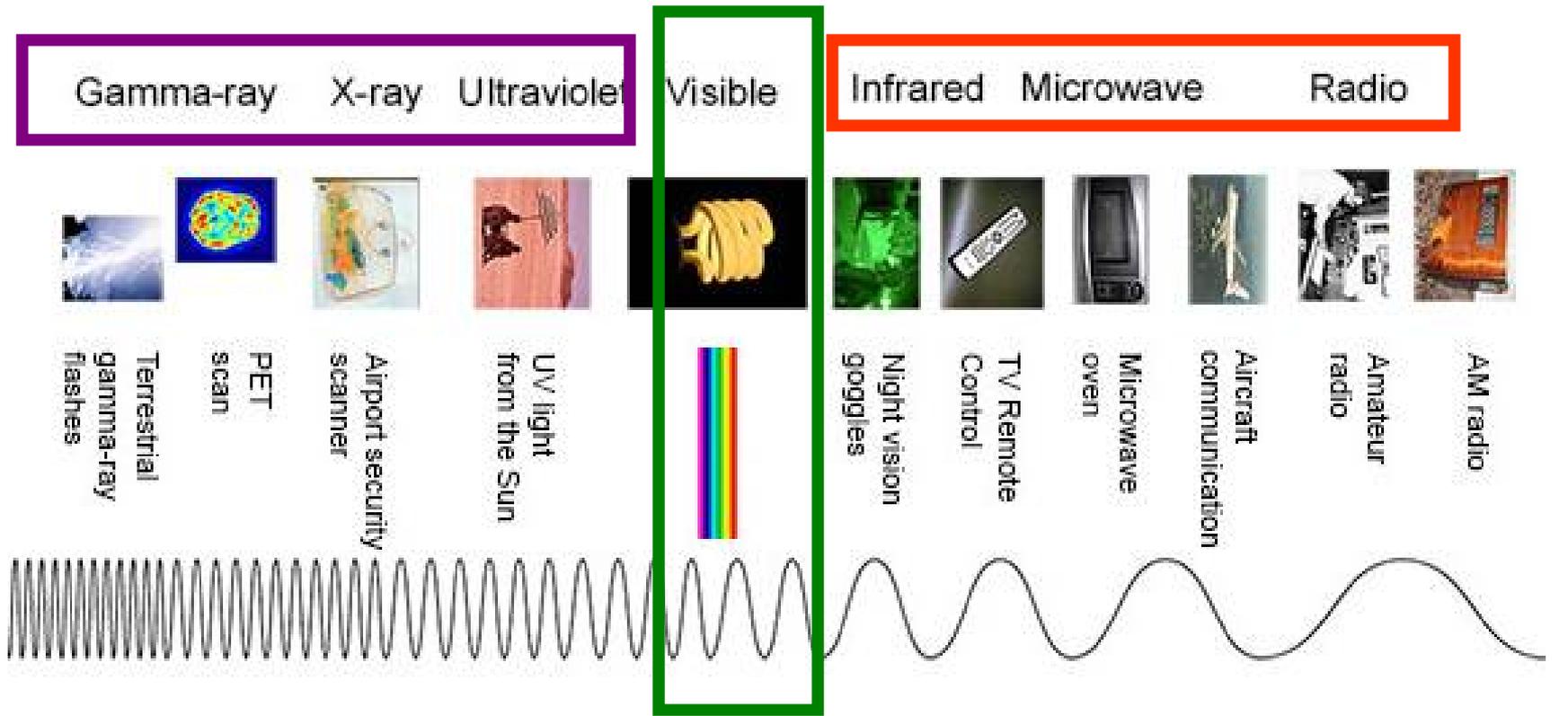


# Another Creation Story - Faith

- **Gen 2:7** *And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.*
- And God created a “gatherer society”... this before the Fall.
- Cast out, survival demanded society become:
  - hunter-gatherers
  - agrarian
  - industrial - steam, electrical
- We soon identified, utilized entire EM spectrum
  - today’s modern info-tech IT society.

# Complete Spectrum of EM Radiation

Generated by man on Earth or incoming from space today, indeed back to the beginning of space-time, detected with telescopes



# Genesis of Space-Time

- **Cosmic vacuum,  $T = 0$** 
  - quantum fluctuations of energy
  - matter & anti-matter, appear and disappear
- **Point singularity,  $T = 0+$**
- **Big Bang – CMB:  $T = 14.7$  billion years ago**
  - time then as we know it today as yet undefined
- **Great Inflation  $T =$  zillionth ns later**
  - 1 zillion **plus one** particles of **matter**
  - 1 zillion particles of **anti-matter** **NOTE 6**
  - That's why we're here, avoided annihilation!
- **Our Universe began  $T \sim 400K$  “yrs” later:**  
**Time & Elements H, He, Periodic Chart  $\sim 120$  elements**

## NOTE 6 **Genesis of Life on Earth**

Planet in the Goldilocks Zone, primordial soup:

- To date, earliest evidence for life: 3.8 billion year old rock, western Greenland; not fossilized remains but a **chemical signature of living organisms**
- Next, ancestors of amphibians, reptiles, fish, dinosaurs, birds; **no mammals** yet
- **66 mil yrs ago**: 75% of Earth's life wiped out by Yucatan meteorite (9 mi. wide, 45K mph), all animals over 55 pounds - back to dust
- Rise of modern animals incl. **mammals** and **humans**

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# *The Questioners*

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# The Questioners through History

**One question answered yields two new queries**

- First scientist, “natural philosopher”:  
Thales of Miletus, ca. 624-546 BC
- Greece: Plato, Aristotle, Archimedes
- Rome: Jesus / Islam, Dark Ages
- Renaissance: Copernicus, Galileo, da Vinci, Brahe, Kepler, Descartes
- Scientific Method developed
- 1800s, door opens to modern science

# Remarkable programs to reach out

## **Astronauts: 1) Earth-Moon**

- Mercury, Gemini, Apollo

## **2) Earth-Int'l Space Station**

- Shuttle

## **3) Earth-Mars**

- *Orion, 2030s*

## **Telescopes: Deep Space**

- Hubble, Optical & UV, 1995
- Chandra, X-ray, 1999
- Kepler, exoplanet hunter, 2009
- *James Webb, optical & near IR (red-shift), 2018*

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# *Contact*

# Will we ever get there?

- **Can we?**
- Can **they** get here from there?
- Physical Vehicles -> matter-energy transfer
  - ✓ Rocket ship, bulky fuel
  - ✓ Solar sails, too slow
  - ✓ Matter-antimatter drive, energy intensive
  - ✓ Ion drive, too slow
  - ✓ Warp drive, worm hole, theoretical, energy intensive

# Can we at least eavesdrop?

## Search for Extraterrestrial Intelligence - SETI

- Hollywood classics
  - ✓ *Forbidden Planet*, 1956
  - ✓ *Close Encounters of the Third Kind*, 1977
  - ✓ *Star Trek First Contact*, 1996
  - ✓ *Contact*, 1998
- Original SETI: Mountain View, CA, 1960s
- Modern SETI, 2016: Thousands of times greater searching/computing power today
- Yet still looking for the proverbial one intelligent grain of sand in all the world's the beaches

## NOTE 7 Drake Equation

$$N = R \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L \quad (7 \text{ factors})$$

**Number of civilizations in Milky Way galaxy with detectable EM emissions**

Rate of formation of stars suitable for intelligent life

% of stars with planetary systems and # planets with an environment suitable for life

% of planets with a) basic life appearing and with b) intelligent life emerging

% of civilizations with technology to release signs of existence into space

length of time they release detectable signals into space

## NOTE 8

# A more current calculation

## Earth Similarity Index (ESI)

- Factors beyond Drake Equation include a planet's, or moon's, physical characteristics such as radius, density, escape velocity, surface temperature
- Some exoplanets have a remarkably high Index yet most are several hundred LY away, out of reach of modern technology

# Sending out messages? (Event #2)

- ❑ “Bottle into the cosmic ocean”, Carl Sagan
  - 1977: Voyagers 1 & 2: “Golden Records” - sounds, images of life and culture on Earth
  - V1 will reach a nearby star in 40,000 years!



- ❑ Do we really want to attract the good, but what could also be the bad and the ugly?

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# *Physical and Spiritual States*

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# Universal States

- Solid
- Liquid
- Gas
- Plasma – e.g. Aurora Borealis
- Bose-Einstein Condensate – artificially created state of matter, cooled to temperatures very close to absolute zero; subatomic particles
- Eternal

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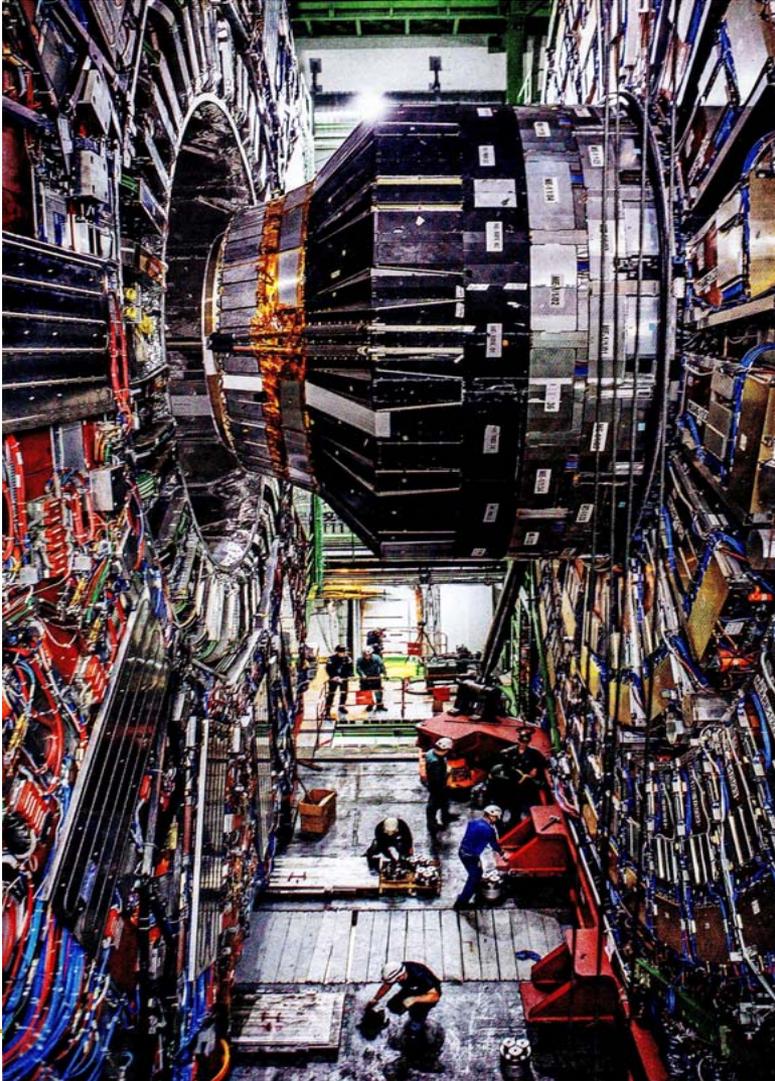
## As the Preacher of Ecclesiastes said ...

*God has put eternity into our minds*

- So that we may merely contemplate the magnitude of **all the worlds of God**
- **God's creation is incomprehensibly greater than this world, yesterday, today, tomorrow, always**
- Far beyond our tools, our physics, math, infinitely beyond terms like “**God particle**”, aka Higgs Boson (Event #1)

# Higgs Boson, 2012

(Event #1)



Long-anticipated

Explains how  
matter gains mass  
“Standard Model”

3 or 4 forces

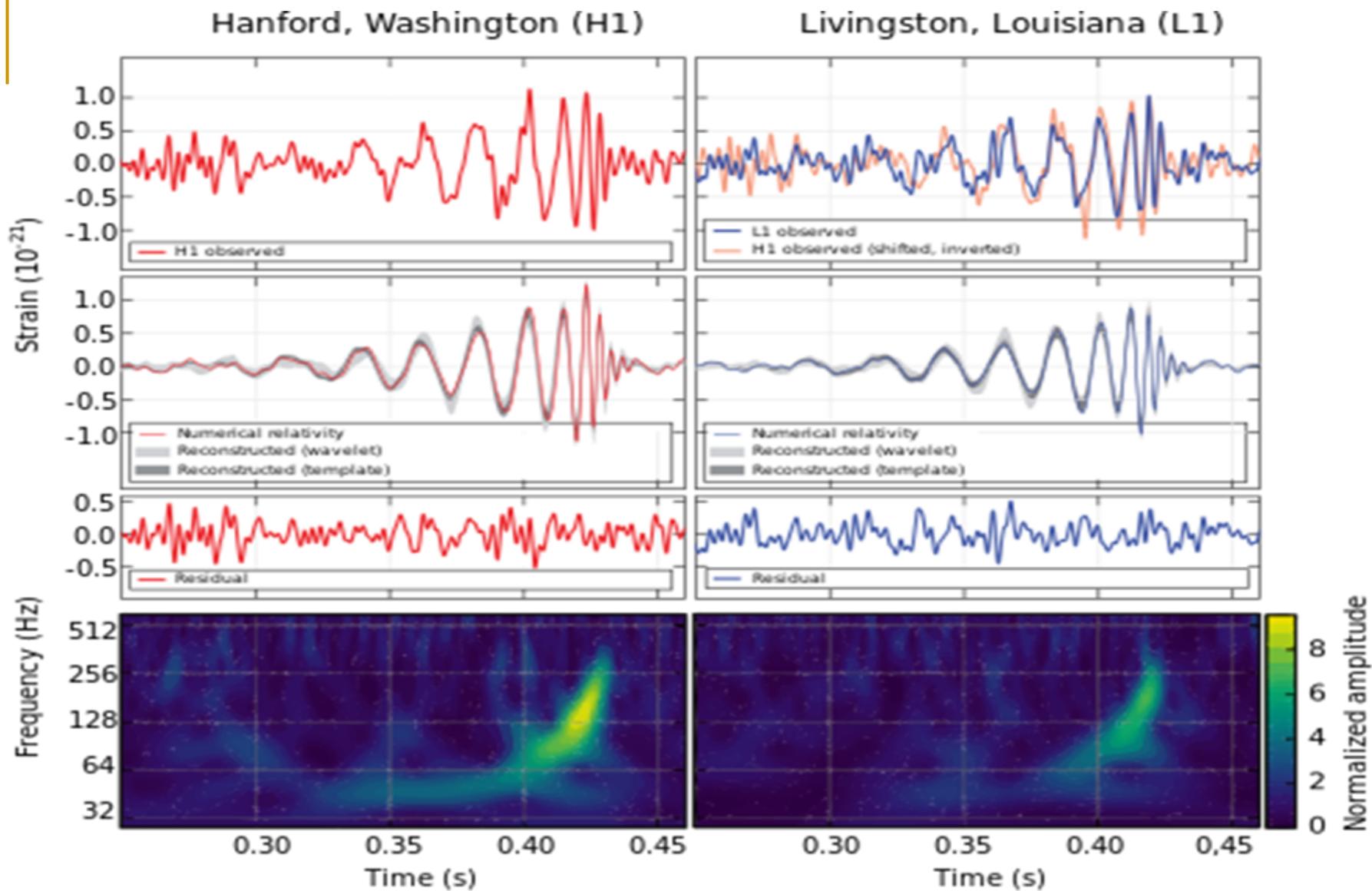
17 particles

Large Hadron  
Collider - LHC  
at CERN

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## Gravity Waves 2015, 2016 (Event #3)

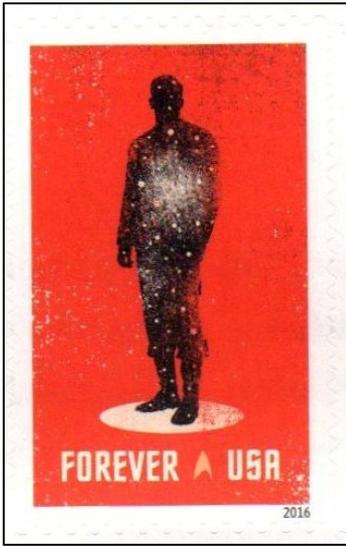
- **Ripples in space-time** created by merging black holes billions of years ago in distant galaxies millions of light years away
- Created huge **gravity waves** at that time, greatly diminished but detected here today for the very first time, two locations and two independent events
- **Gravity particles**, gravitons, yet to be detected ... if they exist at all!



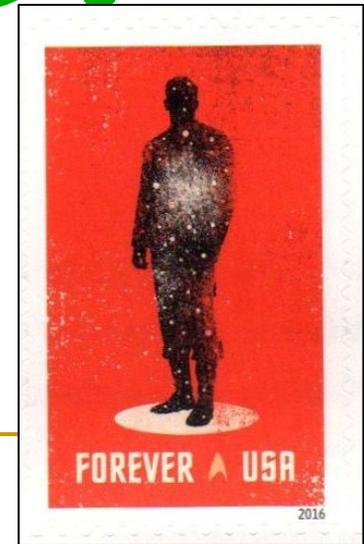
# Gravitation

May link this possible “fourth force” to other three

- ✓ **Electromagnetic force:** gives us power, light, radio, etc.; also binds atoms into chemical compounds and substances
- ✓ **Strong nuclear force:** binds together the atomic nucleus
- ✓ **Weak nuclear force:** tears apart unstable atoms, i.e. radioactive decay; makes atomic energy possible
- ✓ **Gravity as a force: ???**



# *The Teleporter*



# Inanimate Objects and Human Life

Disregard the **Holodeck** and **Computer** which deal w/ inanimate objects ... “A cup of Earl Grey, hot.”

**The Teleporter:** dematerialize – rematerialize

- Electronically, bits & bytes, 1s & 0s ... plausible
- Physically? Matter becoming energy and energy back to matter? Consider the **binding energies** to overcome... *Scientific American*
- Human organs including nervous system; **the brain:** 100 billion neurons, 100 trillion connections; 4x capacity of Library of Congress
- Other chemical compounds, molecules, DNA
- Atoms: electrons & nucleus - protons, neutrons
- Subatomic: leptons, mesons, baryons, quarks

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# Matter-Energy Budget

- Energy and mass are virtually the same thing, just in different forms ( $e = mc^2$ )
- But it's too cost-prohibitive, thus too impractical, to transform mass to energy and back to mass
- All physical means of teleportation are today, and likely will remain so into the 23rd century, constrained by the **Matter-Energy budget**

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# Furthermore ...

## What of the Soul ?,

... asks author Krauss

- Simple spiritual energy?
- Or something more?
- Let's see.....

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# *The Human Soul*

# 1) Human souls in worship in Heaven, NT

*Rev 4:1-2 (KJV) After this I (John) looked, and, behold, a door was opened in heaven: and the first voice which I heard ... said, Come up hither .... And immediately I was in the spirit ....*

*Rev 5:1-5 .... And one of the elders saith unto me ... behold, the Lion of the tribe of Judah, the Root of David, hath prevailed to open the book... to loose the seven seals.*

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## Continuing ... souls in Heaven

*Rev 5:6 -13* When he had taken the book, the four beasts and four and twenty elders fell down before the Lamb .... Thou ... hast redeemed us to God ... out of every kindred, tongue, people, nation; And every creature which is in heaven, and on the earth ... heard I saying, Blessing, honour, glory, power, unto the Lamb for ever and ever.

## 2) A human soul on Earth: Job, OT

*Job 38:1-7 Then the Lord answered Job out of the whirlwind, and said ... Who is this that darkeneth counsel by words without knowledge? .... Where wast thou when I laid the foundations of the earth? When the morning stars sang together, and all the sons of God shouted for joy?*

“Huh, Job, huh?”, asketh the Lord.

=====

**Bottom line:** An artificial matter-energy-matter human teleporter would simply not accommodate the human soul.

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# *The End of Time*

# The end of time

- Our “today”
  - **Time slows down** approaching massive objects
  - **Time ceases** in black holes! Detected at centers of galaxies; we observe X-rays fm accretion disk, edge of event horizon past which no light escapes
- The Physical Universe
  - Modern physicists posit: The Big Rip, the Big Crunch, the Big Whimper
  - Noah knew the end was coming, the flood; just didn't know when
- The Physical-Spiritual End
  - Nazarene carpenter knew, just didn't know when
  - Another possibility: ~~The Rapture~~
- **The Truth: The Second Coming**

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Return with us now to the Stars

*All-Star*

*Lineups*

- 
- Adam and Eve
  - Noah and Abraham
    - Elijah and Moses
  - Solomon and David
    - Mary and Joseph
      - John Baptist
  - Matthew, Mark, Luke, John
    - Peter and Paul
  - Augustine and Aquinas

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# A TEAM: Scientists who believed in God

- Galileo Galilei, 1564-1642
- Johannes Kepler, 1571-1630
- Isaac Newton, 1642-1727

## Age of Enlightenment

- James Clerk Maxwell, 1831-1879
  - Max Planck, 1858-1947
  - Marie Curie, 1867-1934
  - Guglielmo Marconi, 1874-1937
  - Enrico Fermi, 1901-1954
  - Werner Heisenberg, 1901-1976
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## B TEAM: Atheists / Agnostics

- Neils Bohr, 1885-1962
- Erwin Schrodinger, 1887-1961
- Edward Teller, 1908-2003
- William Shockley, 1910-1989
- Carl Sagan, 1934-1996
  
- **Peter Higgs, 1929 - \***
- **Stephen Hawking, 1942 - \***
- **Neil deGrasse Tyson, 1958 - \***

**\* Never too late!**

**NOTE 9**

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## NOTE 9

# Albert Einstein: A half-believing agnostic

“I do not believe in a personal God. If something is in me which can be called religion, then it is the unbounded admiration for the structure of the world so far as our science can reveal it.”

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# Original Star Trek TV Series

- Starship Enterprise encounters a planet on the far side of our galaxy with a civilization that announces itself - via the “Universal Translator” - to be **sun worshippers**.
- Per the Prime Directive, Capt. Kirk and crew are to leave them undisturbed.
- Just before exiting orbit, Communications Officer Lt. Ohuru discovers that they are not worshippers of their sun after all.
- “Captain, they are worshippers of ...  
**the Son!**”

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# *The Last Command*

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Take us out of here, Mr. Sulu



Aye, Captain

Indeed, take us out of here,  
on chariots of fire ...



**NOTE 10**

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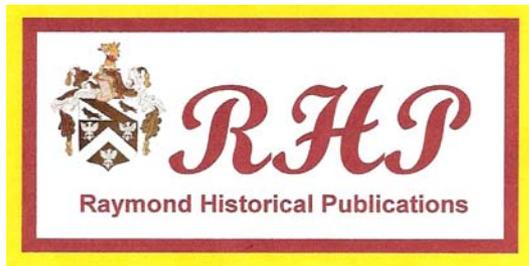
## **NOTE 10** **Are we alone in the Universe?**

- Scripturally: No, see Revelation, angels, etc.
- Imaginatively: “They’re out there and may one day visit or may have already visited.”
- Statistically: We’re probably not alone.
- Practically: We and “they” will likely never know of one another in this our mutually HUGE physical Universe
- Spiritually: Beyond all human understanding

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*The Martian Chronicles*, Ray Bradbury, 1958

*“It is good to renew one’s wonder,” said the philosopher. “Space travel has again made children of us all.”*



Slide show by Thomas M. Raymond  
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