

Scientific Knowledge and Faith

Wednesday, March 25, 2009

CIT luncheon seminar

Scientific Knowledge and Faith

Faith: Firm belief in something for which there is no proof

The term faith is used very broadly in many different contexts.

Scientific Knowledge and Faith

Faith: Firm belief in something for which there is no proof

The term faith is used very broadly in many different contexts.

“Buying stocks in a market like this takes a healthy dose of **faith**...”

New York Times, March 1, 2009

Scientific Knowledge and Faith

Faith: Firm belief in something for which there is no proof

- Faith seems to be a basic human trait and is in its essence optimistic.

Science at the forefront of its activity is essentially faith-based.

The Nature of Scientific Knowledge

◆ All scientific knowledge is empirical, based on experiments and observations leading to hypotheses and theories.

◆ A hypothesis or theory is only applicable in the domain of the performed experiments. (Example Ohm's law)

◆ The theory must be predictive, testable and any contradiction to the theory in the domain of its assumed applicability, invalidates it.

Thomas Huxley: The great tragedy of Science (is) the slaying of a beautiful hypothesis by an ugly fact.

Example of the scientific method



Émilie du Châtelet

b. December 17, 1706 –
d. September 10, 1749

Was a superb scientist.
Translated and commented on
Newton's Principia

Performed key experiments
measuring kinetic energy of moving
objects dropped into sand.

Based on her experimental results she formulated a hypothesis that kinetic energy is proportional to velocity V^2 and not V as Newton proposed.

What is the relationship between faith and science?

For the purposes of responding to this question I would like to define three categories of faith:

1. Faith that contradicts science

2. Faith that is tangential to science (i.e. does not interact with science; not testable by the methods of science.)

3. Faith that drives science

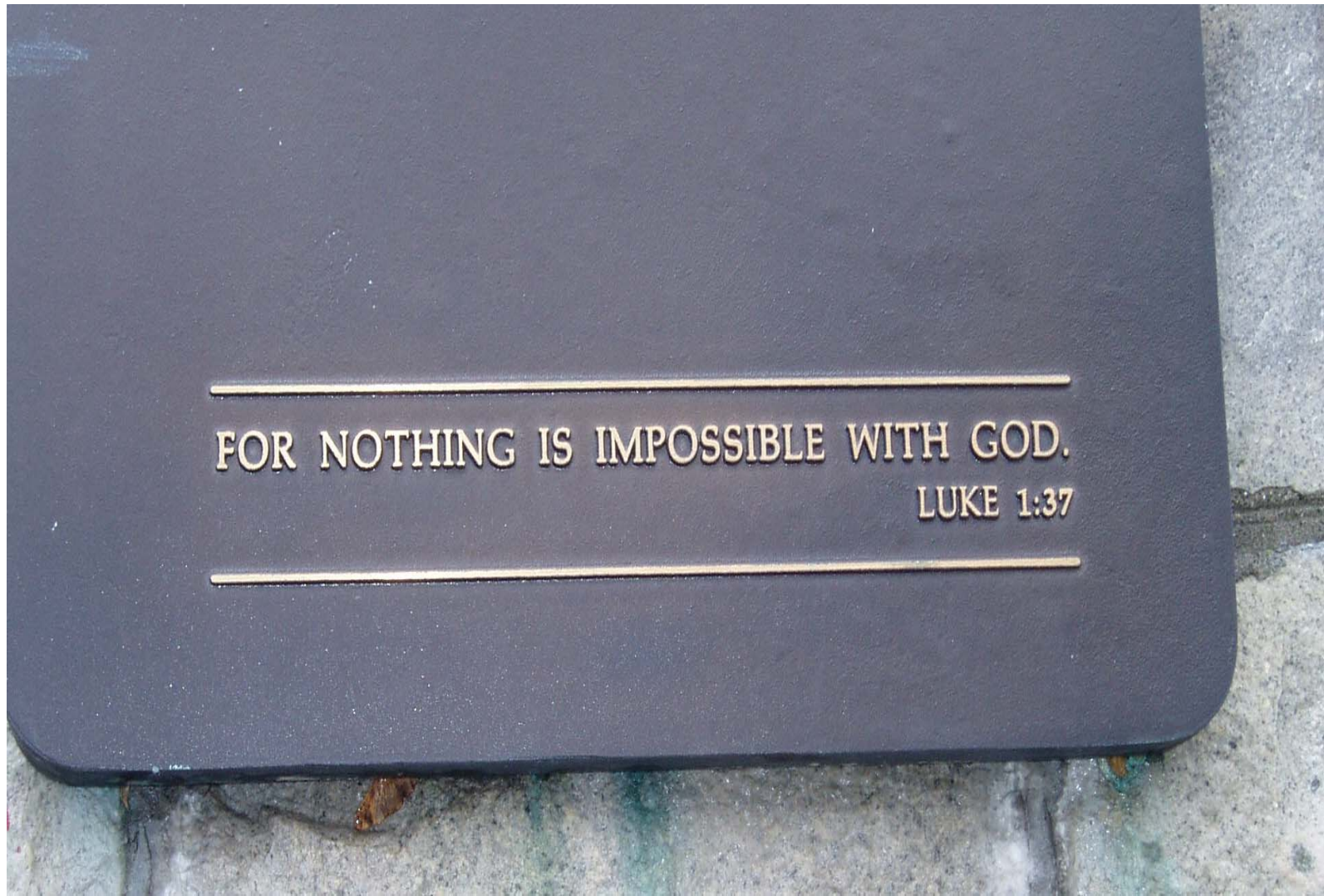


SAINT JUDE GATE

FOR NOTHING IS IMPOSSIBLE WITH GOD.
LUKE 1:37

FOR NOTHING IS IMPOSSIBLE WITH GOD.

LUKE 1:37



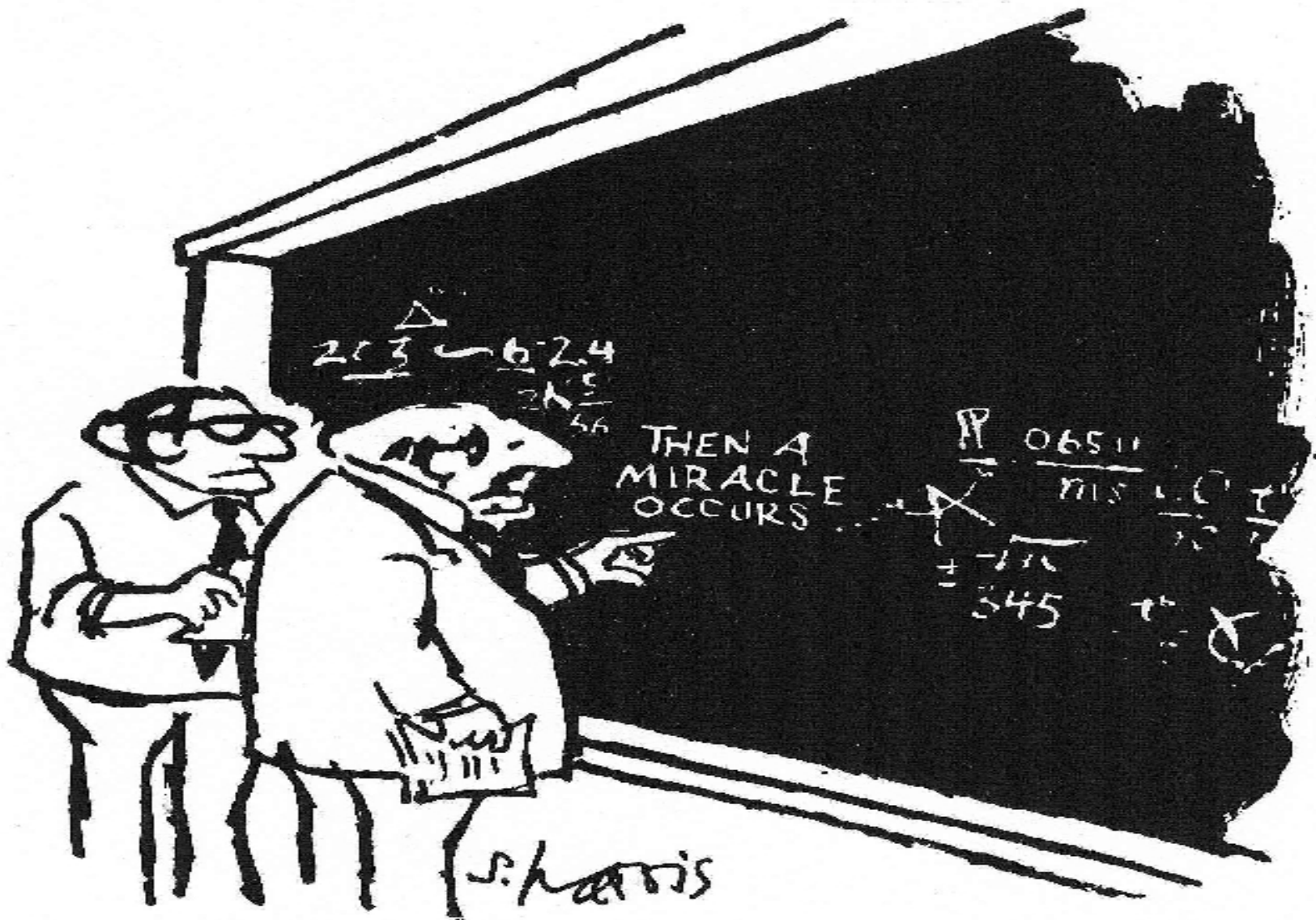
This statement has many possible interpretations including miracles

All religions (that I know) report miraculous events that contradict solidly established scientific principles. (Splitting the red sea, stopping the sun)

1. Faith that leads one to believe in such miracles is in contradiction to science.



(However, such faith does not necessarily interfere with a person doing great science.)



"I think you should be more explicit here in step two."

Type 2. Faith

Tangential to science; (Does not interact with science; not testable by methods of science.)

The big questions:

Is there meaning to life?

Is there a guiding cosmic purpose?

These are not in the domain of science they are in the domain of religion

Type 2 Faith is associated with constructs designed to reconcile and/or merge science with religion.

Pierre Teilhard De Chardin

1881-1955

- Jesuit priest, accomplished geologist, paleontologist
- Integration of faith and evolution.
- He believed there is a purpose in evolution:
 - an ever increasing complexity ascending toward increasing consciousness and unification drawn toward the supreme consciousness; the Omega Point (God).

Teilhard de Chardin, Pierre



Archive Photos

Some see the World Wide Web as a manifestation of this increasing unification of consciousness.

Highly accomplished physicist;
devoted Christian.
Changed careers became Anglican
priest (later bishop).

QuickTime™ and a
decompressor
are needed to see this picture.

From an interview:

“I didn't leave science because I was disillusioned, but felt I'd done my bit for it after about twenty-five years.

...Let me say first of all that I admire Teilhard as someone of integrity who sought to hold together his science and his religious experience, but the details of how he did it don't correspond to how I would try to do it myself. I think it's very important to maintain the classical Christian distinction between the Creator and creation.”

Rev Dr John Polkinghorne, KBE FRS

Highly accomplished physicist devoted Christian.
Changed careers became Anglican priest (later
bishop).

Polkinghorn describes theological
concepts in the language of physics;
specifically Quantum Mechanics

QuickTime™ and a
decompressor
are needed to see this picture.

Rev Dr John Polkinghorne, KBE FRS

He regards mind, soul and body as different aspects of the same underlying reality -- "dual aspect monism" there is only one stuff in the world (not two - the material and the mental) but it can occur in two contrasting states (material and mental phases, a physicist might say) which explain our perception of the difference between mind and matter."

There are several other prominent thinkers (often scientists) among them Freeman Dyson, Alfred North Whitehead who developed and believe in cosmic concepts and systems that are often beautiful and compelling but in essence cannot be tested or proved.

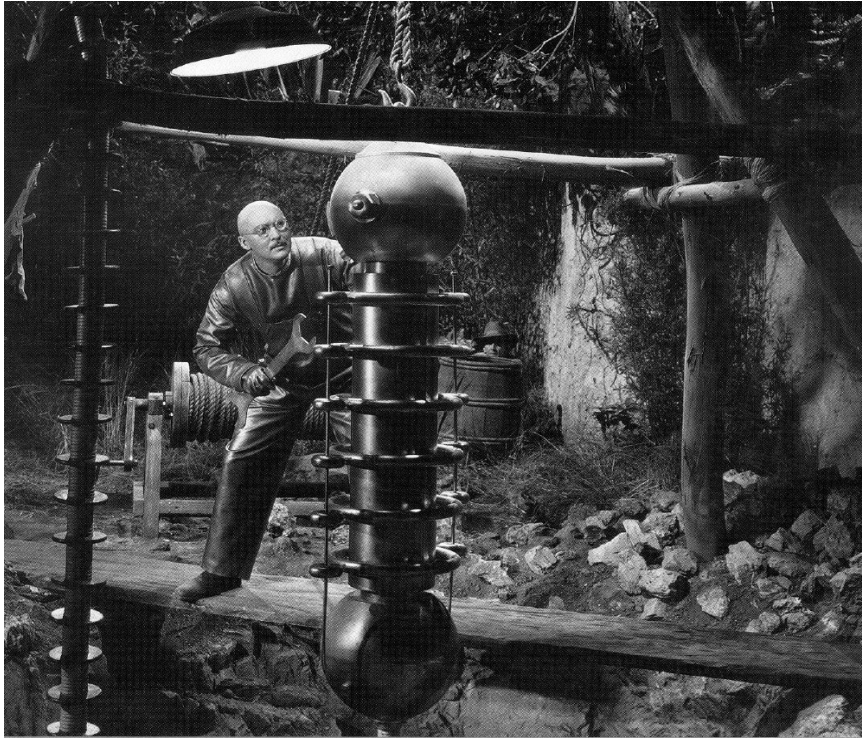
Belief in these constructs depends on faith that is tangential to science (type 2). Such beliefs do not contradict or interact with science; they are not testable by methods of science.

POLKINGHORNE AND DYSON WERE AWARDED THE TEMPLETON FOUNDATION PRIZE

This year's winner (\$1.42 million) was Bernard d'Espagnat:

"I believe we ultimately come from a superior entity to which awe and respect is due and which we shouldn't try to approach by trying to conceptualize too much," he said. "It's more a question of feeling."

What then is the faith that drives science?



On the simplest level, to launch a project one must have faith (belief without proof) that the project will be successful. Sometimes it is and sometimes it is not.

After more than 20 years of research by thousands of people there is still no cure or vaccine for AIDS.

But there is a deeper faith that has motivated science on for the past 200 years.

A faith that there is a unifying principle underlying the diversity of phenomena encountered in nature.

Until recently this has been a largely successful quest.

One of the earliest successes:

The motion of planets is governed by the same laws that govern the motion of objects on earth.

But now this quest for unification has hit a stone wall

Up till about ten years ago there was a large measure of confidence that there were four forces operant in nature:

- Gravitational Force
- Electro-magnetic Force
- Weak Force
- Strong Force

QuickTime™ and a decompressor are needed to see this picture.

The challenge was to unify the four forces by finding one set of equations that would govern all of them.

Einstein struggled most of his life to unify gravity and electro-magnetism with no success.

By the 1960's the Electro-magnetic, the weak and the strong forces were unified.

By the 1960's the Electro-magnetic, the weak and the strong forces were unified. By the **“Standard Model”**

- Electro-magnetic Force
- Weak Force
- Strong Force

Julian Schwinger
Sin-Itiro Tomonaga
Richard Feynman
Murray Gell-Mann
Steven Weinberg
Abdus Salam
Sheldon Glashow

By the 1960's the Electro-magnetic, the weak and the strong forces were unified. By the “**Standard Model**” **but**

- Electro-magnetic Force
- Weak Force
- Strong Force

Julian Schwinger
Sin-Itiro Tomonaga
Richard Feynman
Murray Gell-Mann
Steven Weinberg
Abdus Salam
Sheldon Glashow

**The Standard Model
cannot deal with the**

Gravitational Force

QuickTime™ and a
decompressor
are needed to see this picture.

•Disappointment!!

During the past 50 years 1000's of physicist have attempted to formulate a viable model such as String Theory that would include gravity.

- Electro-magnetic Force
- Weak Force
- Strong Force

So far without success

Gravitational Force

Ten years ago an unforeseen fascinating complication developed:

◆ The expansion of the universe is observed to accelerate due to some mysterious anti-gravity force.

and

◆ Some unknown dark matter permeates the universe.

96% of the universe is composed of this mysterious dark matter and energy

• The universe we can observe and know constitutes only 4% of it all.

Ten years ago an unforeseen complication developed;

◆ The expansion of the universe is observed to accelerate due to some mysterious anti-gravity force and

◆ some unknown dark matter permeates the universe.

- Electro-magnetic Force
- Weak Force
- Strong Force

Gravitational Force
Dark Energy (Force)
Dark Matter

Ten years ago an unforeseen complication developed;
The expansion of the universe is observed to accelerate
and some unknown dark matter permeates the universe.

- Electro-magnetic Force
- Weak Force
- Strong Force

**The Standard Model
cannot deal with the
Gravitational Force**

Dark Energy

Dark Matter

**96% of the universe
is composed of this
mysterious dark
unknown matter
and energy?**

Ten years ago an unforeseen complication developed;
The expansion of the universe is observed to accelerate
and some unknown dark matter permeates the universe.

- Electro-magnetic Force
- Weak Force
- Strong Force

For some this is a
source of frustration

**The Standard Model
cannot deal with the
Gravitational Force**

Dark Energy

Dark Matter

**96% of the universe
is composed of this
mysterious dark
unknown matter
and energy?**

Ten years ago an unforeseen complication developed;
The expansion of the universe is observed to accelerate
and some unknown dark matter permeates the universe.

- Electro-magnetic Force
- Weak Force
- Strong Force

**The Standard Model
cannot deal with the
Gravitational Force
Dark Energy
Dark Matter**

**But most people working in this field are
excited by the new developments and retain
their **faith** that there is a unifying principle
governing the universe.**

QuickTime™ and a
decompressor
are needed to see this picture.