

# Scientific Knowledge and Faith

Wednesday, March 25, 2009

CIT luncheon seminar

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

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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



# 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.

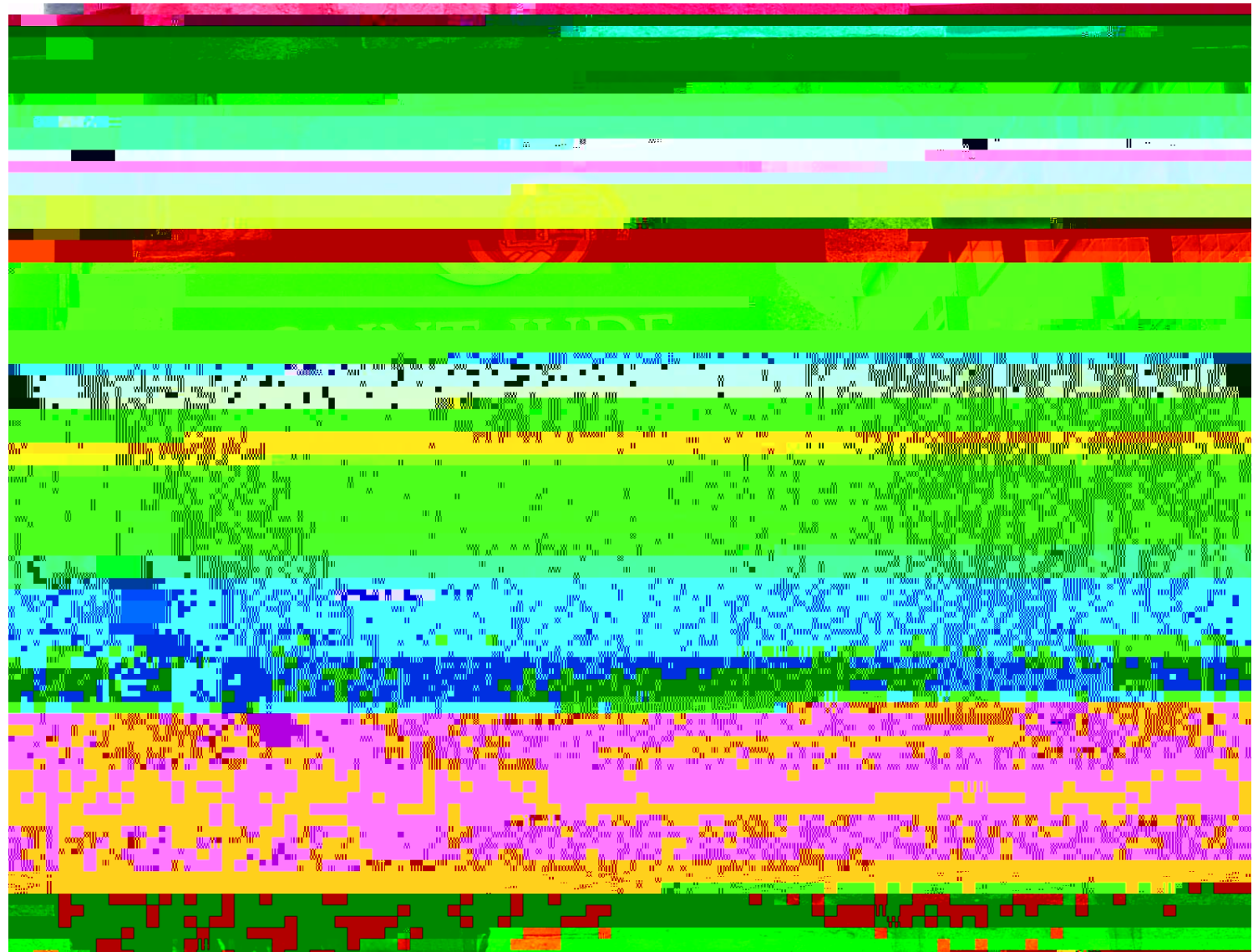
# What is the relationship between faith and science?

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

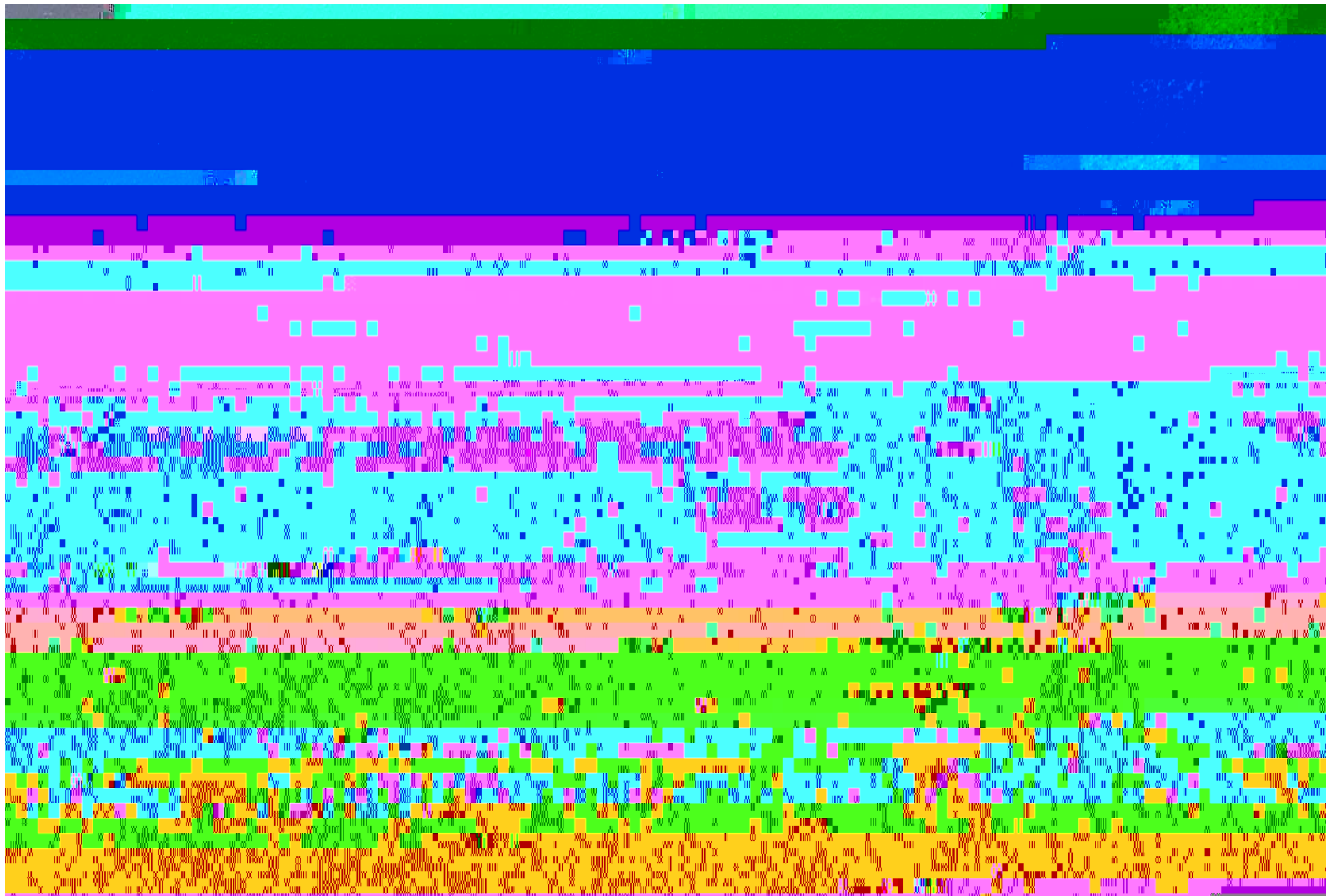
1. Faith that contradicts science

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

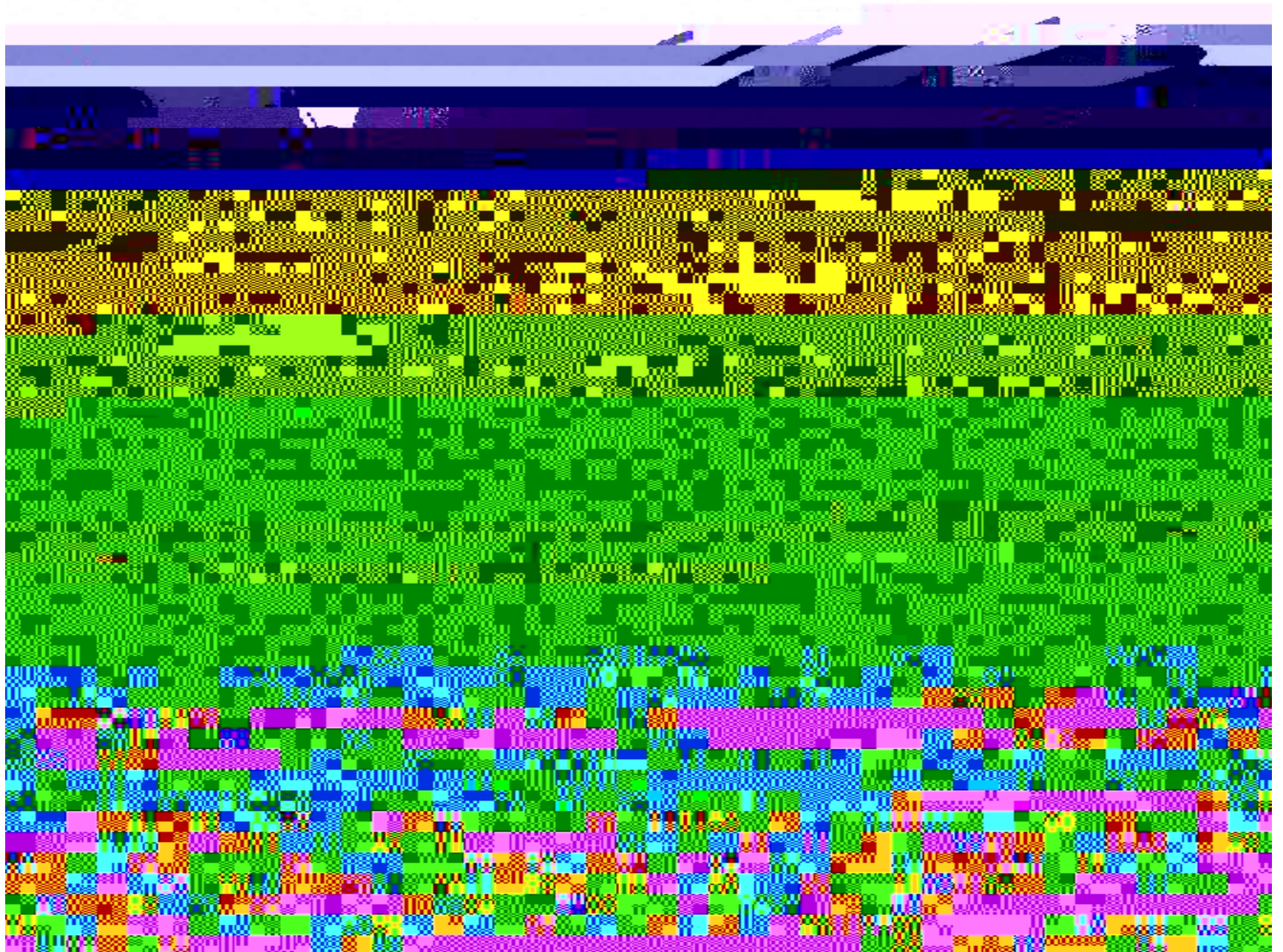












# Type 2. Faith

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

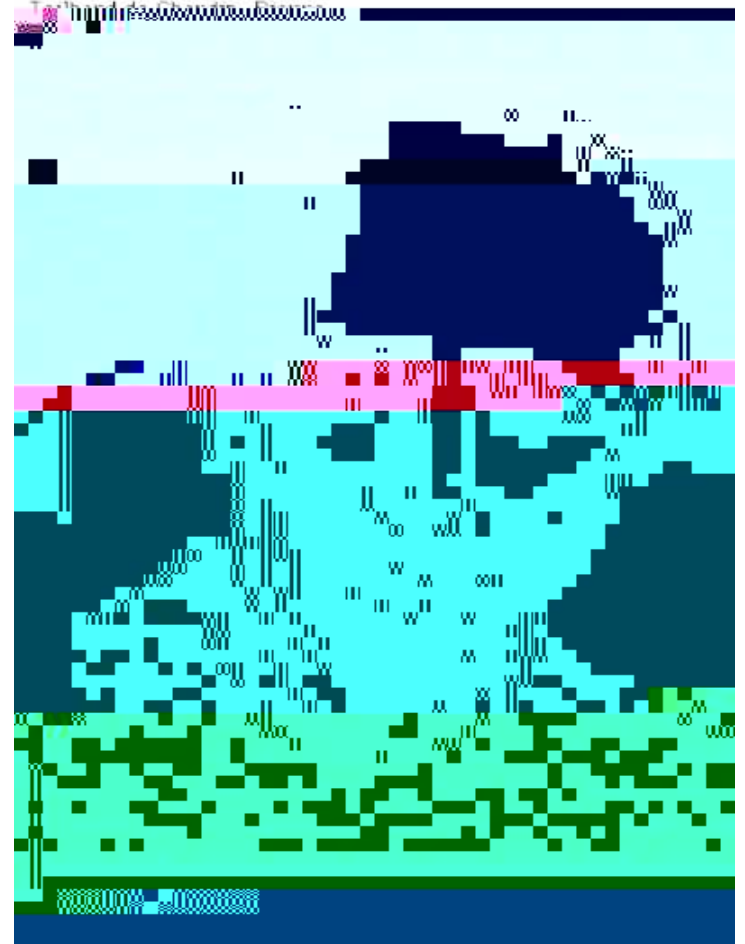
Type 2 Faith is associated with constructs designed to reconcile and/or merge science with religion.

# 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).

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**

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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."









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.

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- 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

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**The Standard Model  
cannot deal with the**

**Gravitational Force**

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**•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.**

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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**

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and some unknown dark matter permeates the universe.

- Electro-magnetic Force
- Weak Force
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**The Standard Model  
cannot deal with the  
Gravitational Force**

**Dark Energy**

**Dark Matter**

**96% of the universe  
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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**

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•0

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