What Does the Discovery of "The God Particle" (Higgs Boson) Have to Do With God?

In March 2013 scientists from the Large Hadron Collider in Switzerland confirmed discovery of the "Higgs boson" particle, often called "The God Particle" by the media. The search lasted 49 years and involved over 1.000 scientists. This workshop outlines the Standard Model of elementary particles and how the Higgs boson proposal arose. We will discuss the scientific meaning of the media statement "the Higgs gives mass to all other particles without which we and the world as we know it would not exist." The simplicity and beauty of the resulting model will be explained. But, how did this particle gain the title 'the God particle" and where does it get its creative and spiritual identity in the public mind? What spiritual implications does it have, and how is it related to traditional religious beliefs, like those of Christianity? How do we formulate effective scientific apologetics to answer challenges like this to Biblical Christianity, and help people understand the Biblical world view better?

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OUTLINE

I. Standard Model of Particle Physics Review.

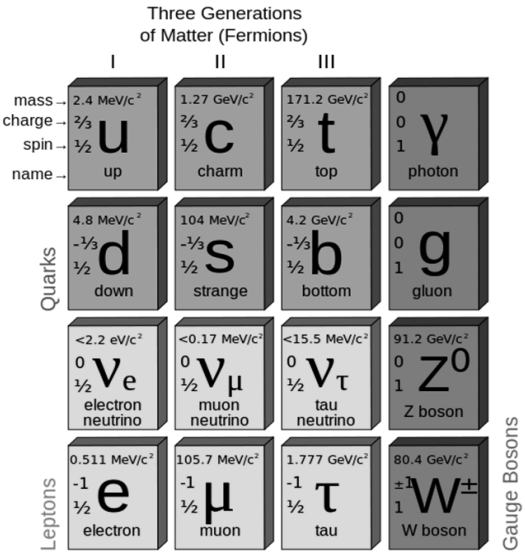
A. Brief history leading up to quarks

B. Three forces mediated by 3 mesons among 12 particles ("boson" means integral spin; "fermion," half-integral spin.)

C. Strongly interacting particles: nuclei

1. Old picture: neutron, proton, pi mesons

2. New picture: quark clusters & gluons



Elementary particles in The Standard Particle Model.

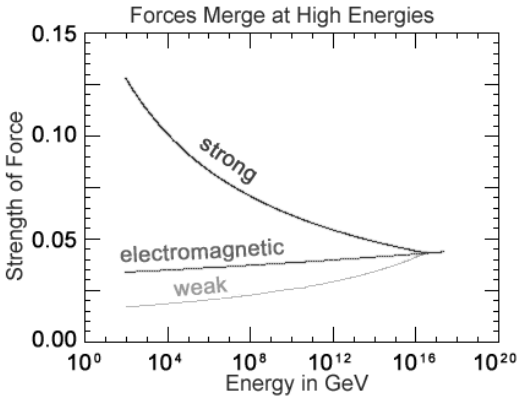
D. Electromagnetic interactions: charged particles and photons

E. Weak interactions: the leptons and the three intermediate vector mesons
   1. Beta decay

   2. Pion decay

II. What Are Grand Unified Theories (GUTs) and Why Are They Needed.
   A. The triplet of quarks {u, d, s} and the group SU(3) with its representations

   B. In very high energy collisions the three forces become the same strength and all 16 objects in the figure above seem to have zero mass: a higher symmetry?



Force strength vs. collision energy.

   C. Several GUTs have been proposed, but all have problems like infinite answers and lack of known structures at low energy—the real low-energy world breaks the symmetry!

III. Beautiful Mathematics: The Higgs Boson and Spontaneously Broken Symmetry.
   A. In physics spontaneous symmetry breaking takes place when a system's equations have a symmetry, but the system's lowest energy (vacuum) state doesn't have the symmetry.

B. Goldstone first gave a general method to deal with spontaneous symmetry breaking. His method introduces additional mesons while redefining the other particles.

C. Peter Higgs applied Goldstone's method to the Standard Model, predicting the massive Higgs meson, masses for the $W^{\pm}$ and Z^0, and masses for some of the other particles.

D. The resulting improved Standard Model showed spontaneous symmetry breaking, and...

1. No infinities – the theory became "renormalizable."

2. The lowest energy state had masses for particles that should have $m > 0$.

3. The lowest energy state had three different force strengths in the right order!

IV. Fifty Years: The Search for the Higgs, the LHC and Final Success.

A. At first physicists looked for the Higgs at existing accelerators and didn't find it.

B. The higher energy Tevatron was built near Chicago, upgraded, and might have seen the Higgs before shutdown on 30.9.11.

C. The Large Hadron Collider (LHC) was built with collision energy in excess of the expected Higgs mass range and much higher probability of producing them.

D. In July 2012 the group of 1.000 LHC experimental physicists reported probable discovery with a measured mass of 125 Gev/c^2 and confirmed it in March 2013.

V. Who Named the Higgs "The God Particle" and Why?

A. Nobel laureate experimental particle physicist, Leon Lederman, published the book *The God Particle: If the Universe is the Answer, What is the Question?*

1. Lederman's original title.

2. The title “negotiated” with the publisher.

3. The book is a particle physics history with few spiritual overtones.

B. Media introduction of the spiritual and metaphysical implications of the Higgs.

1. The God Particle sensationalized to increase media appeal.

2. Appeal to people’s felt need for spiritual reality and a God substitute.

3. Mysticism used to justify scientific expenditures.

4. Resistance among serious physical scientists.

5. Dilbert even takes notice:

Dilbert comic strip from 21.2.12 <www.dilbert.com>

VI. Why Does Media Hype Resonate With People?

A. Need to be stimulated or excited.

B. A longing for spiritual reality

C. Buttressing materialism with a pseudo-spiritual dimension.

D. Search for a God substitute —> idolatry.

VI. Of Primary and Secondary Causes and Limitations of a Material World View.

A. Hawking: *"Because there is a law of gravity, the universe can and will create itself out of nothing."*

B. Primary and secondary causes as a philosophical question.

C. Is natural law a primary or secondary cause, i.e. is there a Creator?

D. Why should mathematical laws exist to govern natural cause and effect?

E. Are the mathematical laws governing nature even secondary causes?

VII. Coherent Integration Provided by the Biblical World View.

A. Primary cause is a Personal Creator, who gives His Name as "I AM."

B. Human beings are created in the image of God, with God image minds.

C. God's character is to act lawfully and regularly in the natural world.

D. Our logic, mathematics, and powers of observation reflect the mind of the Creator, so they capture reality –>fundamental justification for validity of science.

E. The words of God supplement the works of God—another source of truth about reality.