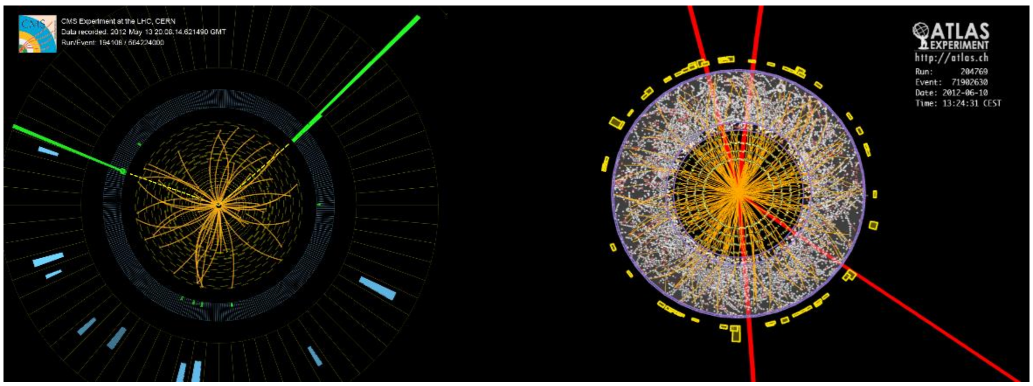
Smoking gun physics

The discovery of the Higgs particle and other ghosts

The images below show the so-called evidence for the presumed reality of the Higgs boson:

(1) Two gamma rays emerging from the CERN LHC CMS detector, and
(2) The tracks of four muons in the CERN LHC ATLAS detector.



We can*not* directly observe the Higgs particle itself because it is just like the other bosons: it is too short-lived to leave any other trace. When two protons hit each other – both with an energy of about 4 TeV – then all that's left is *debris* flying around. The energy of this *debris* (the gamma rays or the muons) tells us the energy of this so-called Higgs particle must be about 125 GeV. We hesitate to use the term 'particle' for the Higgs boson because its lifetime is of the order of 10^{-22} s. That's not something you would associate it with the idea of a particle: a *resonance* in particle physics has the same lifetime. Think of it as the time an electron needs to go from electron orbital to another. Even at the speed of light – which an object with a rest mass of 125 GeV/c^2 cannot aspire to attain – a particle with such lifetime cannot travel more than a few *tenths* of a femtometer: about 0.3×10^{-15} m, to be precise.

In short, we'll never *see* the Higgs boson—just like we'll never *see* the $W^{\pm}$ and Z bosons whose mass it's supposed to explain. Neither will none of us ever *see* a quark or a gluon: physicists tell us the *signals* that come out of colliders such as the LHC[1] or, in the 1970s and 1980s, that came out of the PETRA accelerator in Hamburg, the Positron-Electron Project (PEP) at the Stanford National Accelerator Laboratory (SLAC), and the Super Proton-Antiproton Synchrotron at CERN, are *consistent* with the hypothesis that the strong and weak forces are *mediated* through particles known as bosons (force carriers) but – truth be told – the whole idea of forces being *mediated* by bosons is just what it is: a weird theory.

[1] After the Higgs events, the LHC was shut down for maintenance and an upgrade, after which the beams reached 7 TeV energies.

The idea of a virtual particle

Maybe we should first discuss the most obvious of all bosons: the photon. Photons are real. Of course, they are. They are, effectively, the particles of light. They are, in fact, the only bosons we can effectively *observe*. In fact, we've got a problem here: the only bosons we can effectively *observe* – photons – do *not* have the theoretical properties of a boson: as a spin-1 particle, the theoretical values for its angular momentum are $\pm\hbar$ or 0. However, photons don't have a zero-spin state. Never. This is one of the things in mainstream quantum mechanics that has always irked me. All courses in quantum mechanics spend like two or three chapters on why bosons and fermions are different (spin-one versus spin-1/2) and, when it comes to the specifics, then the only boson we actually know (the photon) turns out to *not* be a typical boson because it can't have zero spin.

More importantly, no course in physics has ever been able to explain why we'd need photons in the role of *virtual* particles. Why would an electron in some atomic orbital continuously exchange photons with the proton that holds it in its orbit? When you ask that question to a physicist, he or she will start blubbering about quantum field theory and other mathematical wizardry—but he or she will never give you a clear answer.

I don't think there is a clear answer. Worse, I've started to think the whole idea of some particle *mediating* a force is nonsense. It's like the 19th-century *aether* theory: we don't need it.

We don't need it in electromagnetic theory: Maxwell's Laws – augmented with the Planck-Einstein relation – will do.[2]

We also don't need it to model the strong force. The *quark-gluon* model – according to which quarks change color all of the time – does *not* come with any simplification as compared to a simpler *parton* model:

1. The quark-gluon model gives us (at least) two quarks[3], two anti-quarks and nine gluons, so that adds up to 13 different objects.
2. If we just combine the idea of a parton – a pointlike carrier of *properties* – with… Well… Its properties – the possible electric charges ($\pm$2/3 and $\pm$1/3) and the possible color charges (red, green and blue) – we've got 12 partons, and such 'parton model' explains just as much.[4]

We also don't need it to model the weak force. Why do we even need the concept of a *force* to explain why things fall apart? The world of unstable particles – *transient* particles as I call them – is a different realm altogether. Physicists will cry wolf here: CERN's Super Proton-Antiproton Synchrotron produced evidence for W^+, W^- and Z bosons back in 1983, didn't it?

No. The evidence is just the same as the 'evidence' for the Higgs boson: we produce a short-lived blob of energy which disintegrates in no time (10^{-22} s or 10^{-23} s is no time, really) and, for some reason no one really understands, we think of it as a force carrier: something that's supposed to be very different from the other blobs of energy that emerge while it disintegrates into *jets* made up of other transients and/or

[2] See: Jean Louis Van Belle, *A Classical Quantum Theory of Light*, 13 June 2019. All my papers are published on academia.edu (https://independent.academia.edu/JeanLouisVanBelle).
[3] We write *at least* because we are only considering *u* and *d* quarks here: the constituents of all stable or fairly stable matter (protons and neutrons, basically).
[4] See: Jean Louis Van Belle, *A Realist Interpretation of QCD*, 16 July 2019.

resonances. The end result is always the same: the various blobs of energy further dis- and reintegrate as stable particles (think of protons, electrons and neutrinos[5]). There is no good reason to introduce a bunch of weird *flavor* quantum numbers to think of how such processes might actually occur. In reality, we have a very limited number of permanent fixtures (electrons, protons and photons), hundreds of *transients* (particles that fall apart) and thousands of resonances (excited states of the transient and non-transient stuff).

You'll ask me: so what's the difference between them then?

Stable particles respect the $E = h \cdot f = \hbar \cdot \omega$ relation—and they do so *exactly*. For non-stable particles – transients – that relation is slightly off, and so they die. They die by falling apart in more stable configurations, until we are left with stable particles only. As for resonances, they are just that: some excited state of a stable or a non-stable particle. Full stop. No magic needed.[6]

Conclusions

We think the idea of *virtual* particles, gauge bosons and/or force-carrying particles in general is superfluous. The whole idea of bosons mediating forces resembles 19th century *aether* theory: we don't need it. The implication is clear: if that's the case, then we also don't need gauge theory and/or quantum field theory.

Jean Louis Van Belle, 20 July 2019

[5] If we think of energy as the *currency* of the Universe, then you should think of protons and electrons as bank notes, and neutrinos as the coins: they provide the *change*.

[6] See: Jean Louis Van Belle, *Is the Weak Force a Force?*, 19 July 2019.