What's in a name?

The Standard Model and other monstrosities

by Joe Lykken, Fermilab

I have heard conflicting reports as to who decided to call one of the most spectacular intellectual innovations of human history "the Standard Model," physicists' best construct for explaining the range and behavior of elementary particles that make up the universe as we know it. Some say it was Sam Trieman, others say Steven Weinberg. At first, the Standard Model referred just to the newly emerged electroweak theory, originally called the Weinberg model. Quantum chromodynamics was subsumed into the Standard Model some years later, gradually and without fanfare.

But rather than try to penetrate the mists of time, let's just admit that the name is our fault. We particle physicists collectively propagated this pentasyllabic monstrosity, and now it is too late to change it. Not only is the name boring, it is also inaccurate. While the Standard Model has indeed become the universally accepted standard description of particle physics, the features of the theory itself are exceptional. How could we birth this precious child, gaze upon his golden locks and shining eyes, and name him "Bud?"

Names are important. This is a corollary of the theorem: "Perception is reality." Imagine how history would have been different if Napoléon Bonaparte had been named Pépé Le Pew. Indeed. budding dictators such as Ioseb Jughashvili and Adolf Schicklgruber knew instinctively that, if you want the world at your feet, you had better get a good name.

We physicists have a special responsibility when it comes to naming our intellectual creations. The ideas and discoveries that are successful become immortalized, and their

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FERMILAB
TECHNICOLOR
FORCES
SUPERSTRING
QCD
STANDARD
SYMMETRY
WIMP
ZILLA
HEHKBAT
ANGLE

names along with them. The atom is still called the atom, 2400 years after Democritus coined the name.

It is likely that "electron" and "quark" (good names!) will be in use for as many millennia as humans or their cybernetic replacements manage to exist. The names of particles are much more likely to survive the ravages of history than the names of the physicists who named them, or even the names of the physicists who discovered them. Who named the photon? Hint: it was a chemist. Quick, who discovered the muon?

The search for names

Physicists name a lot of things: particles, forces, symmetries, theories, laws, rules, detectors, accelerators, laboratories, reports, programs, and even conference series. Here are the criteria that we should all follow, but are often not following, when it comes to naming:

1: Names should be serious and accurate.

2: It is good to name things after people, but only if you can resist the pressure to hyphenate with two or three extra names.

3: Names should be evocative and inspiring.

Violations of the first criterion are usually dealt with harshly by our peers, especially the editors of *Physical Review.* Exceptions are "truth" and "beauty," which I still see used in reference to the top and bottom quarks. If you are one of the people who are still doing this, stop. Do not use as an excuse "strange" and "charm"; these names, though a bit precious, are accurate references to the strange properties of hadrons first seen in cosmic rays, and of the fourth quark who existence causes the seemingly magical "GIM cancellation".

Speaking of GIM, this is one of the ways of dealing with the dispiriting phenomenon of concatenating names of physicists to make hyphenated strings of gobbledygook. Sometimes, as in the case of GIM, these can be replaced by euphonious acronyms, but this doesn't always work. The elegant "Altarelli-Parisi" evolution of QCD has become the horrifying "DGLAP."

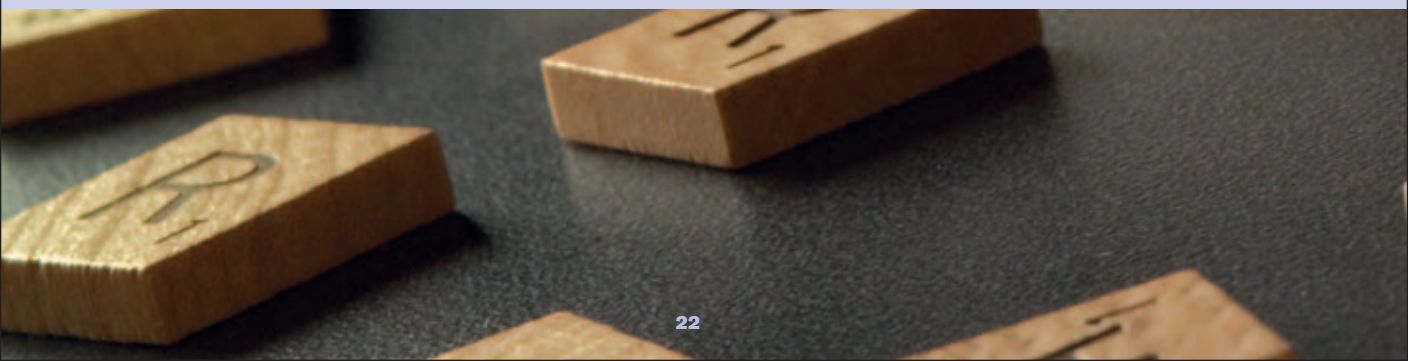
We should continue to name things after physicists, but in doing so we must accept the fact that a good name is more important than giving everybody credit. You can't have it both ways. The perfect example is Higgs. This is a very good name for a particle, a field, and a mechanism. We could call them HEHKBANGs instead, for "Higgs-Englert-Hagen-Kibble-Brout-Anderson-Nambu-Guralnik," but that would be foolish.

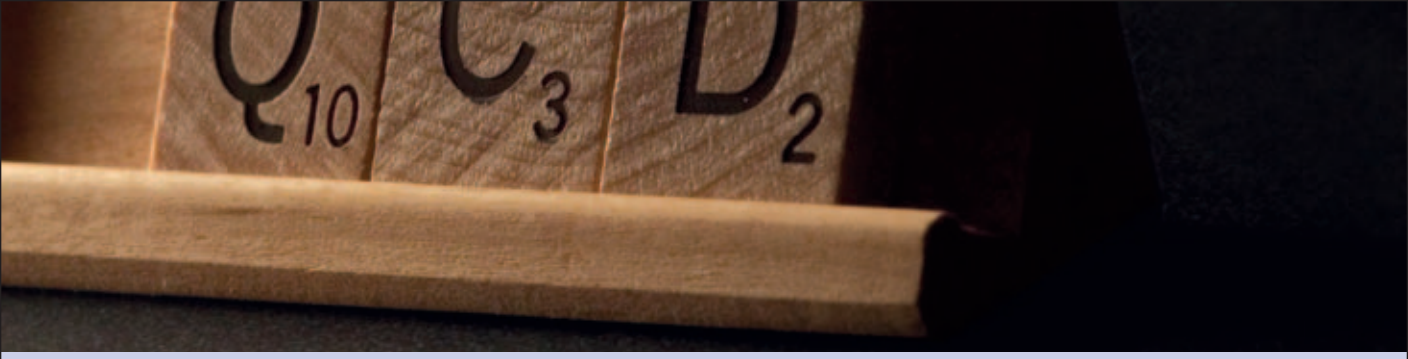
The third criterion is the one where we are truly doing our field a disservice. By not coming up with names that are evocative and inspiring, we convey a seriously damaging impression to the outside world. Yes, it is difficult to invent names that are both serious and evocative, but you have to try anyway.

Good, bad and ugly

At the risk of alienating myself from thousands of my colleagues, let me give you a few examples. I hasten to add that I am only passing judgment upon the names, not upon the quality of the things themselves, or the people associated with them. I do claim, however, that the quality of the things themselves and the people associated with them, as perceived by the world outside physics, is affected by the quality of the name.

Tevatron is a good name for an accelerator. In fact it is slightly better than cyclotron and Bevatron, from which it derives. Three letter acronyms are bad names for accelerators: LEP, LHC, NLC, ILC and SSC are all bad. No non-physicist even remembers the name SSC anymore; what they remember is "the supercollider."





Supercollider is a great name. I have started calling the LHC the supercollider; you should, too.

SLAC, CERN and DESY are all bad names for labs: meaningless (to the public) acronyms that do not resonate. Los Alamos, Argonne, Brookhaven, etc. are all harmless, being just place names. Lawrence Berkeley National Laboratory, or LBNL, should get wise and change their name to the Lawrence Laboratory. Ernest Lawrence was a hugely charismatic figure, in addition to a great physicist, and without too much effort his memory could be Feynmanized with the public. Fermilab is a good name for a lab. People in the Chicago area who have no idea what goes on at Fermilab nevertheless have a positive impression of it. Why? Because they like the name. The only problem is, if you go to Fermilab, there is no Fermi. This contradiction should be corrected.

Acronyms for experiments/detectors have become universal. What amazes me is the huge variation in quality. There are fine choices like BaBar, ALEPH, and ATLAS, but there are many that seem completely random: L3, DZero, CMS, UA1, CDMS, etc. There are some that are just plain weird, like MiniBooNE and KamLAND. I am only a theorist, so I must be missing something here. How can you put twenty years of your life into an experiment and not give it a good name?

Theorists cook up lots of bad names, too. QCD sounds OK, but nobody that I know ever says "quantum chromodynamics" with a straight face. Alas, it is too late to do anything. Technicolor is a bad name; although it is accurate (Technicolor is strong color) the name doesn't sound serious. Supersymmetry is a good name for a symmetry or a theory. It was originally called Hypersymmetry by Pierre Fayet, which indeed sounds better if you are French. Unification is a good word, but Grand Unification sounds a little pompous, and "GUT" is almost as bad as DGLAP. The string community is still confused about the name of the thing they are creating. It is called either string theory, or superstring theory, or M theory. Let's end this controversy right now: string theory is the correct choice. Superstring theory is overly descriptive, and M theory sounds meaningless.

In the past we have been especially inept in naming the reports that we prepare periodically in hopes of influencing the government or the public. A bad name means quite literally that the document is never read, which in many cases was probably a good thing, because the report itself was deadly dull. A good name shows that you get it, that you have some clue as to who your audience is. Which would you rather read: *Perspectives on future directions for elementary particle physics,* or *From Quarks to the Cosmos*? If your report is successful, you would like it to inspire a well-funded experimental initiative. If it has a short catchy name, like *Beyond Einstein* or *Quantum Universe,* then you are already a step ahead.

Clearly we particle physicists (high energy physicists? elementary particle physicists?) have to do better. It could be worse though: we could be cosmologists. The cosmologists have the worst of both worlds. They are plagued by non-serious cutesy names, from the Big Bang all the way to Wimpzillas and the Cardassian Expansion. At the same time, they have decided to adopt the name Standard Model to refer to the currently favored cosmological scheme, apparently because their previous name, the "LambdaCDM Concordance Model" was even worse. Should we charge them a licensing fee?

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