Expandable Language for an Expanding Universe - K.C. Cole

It's not hard to say what I love about physics. Or hard to spell, either. You won't find a term like polytetraflouroethtlele in a physics book. You'll never have to stumble over acrasiomycota or mycorrhiza or dinoflagellates. The words of physics tend to be short, simple, to the point: force, energy, momentum, mass, spin, time, black hole, dark matter. The trouble is, the words don't always mean what they say.

Take electric charge, for example. It comes in two varieties, positive and negative.But while an atom with a few extra electrons buzzing around its periphery is negatively charged, an atom with a shortage of electron is positive. Go figure.

Or what about "accelerate"? Most people use the word to mean speed up. Physicists also use it to mean slow down, or even change direction. A biologist or a chemist probably would have made upo a new term to describe these other kinds of acceleration, but physics likes to keep things simple. Alas, it can make it hard to tell whether you are coming or going.

Other terms are simply approximations that everyone knows you can't take literally, The term "spin", for example. Just about everything in the universe has it, including elementary particles. But some particles - like electrons - have no dimension. They are so small, they are no more than points. An electron has no inside or outside; it has no center to spin around. Spin was a close as the physicists could come to describing a newly discovered property of particles that has no real description in everyday speech.

Some terms in physics even mean the opposite of their everyday definitions. Think of "symmetry" and most people conjure up a snowflake or patterned tiles or the twin wings of a butterfly. To a physicist or a mathematician, those are examples of "broken symmetry". To them, an example of a truly symmetric object would be a sphere, because no matter how you turn or move a sphere, it still looks the same as it did before you changed it.

You'd think that by now physicists would have learned to be more careful with the way they throw words around. But no, even new concepts get obscured with the same confusions. In the 1970s, astronomer Vera Rubin confirmed that galaxies are hurtling around in clusters so fast that they should be flying right off into space. Some invisible glue is holding them together - probably gravity - and gravity comes only from mass.

The still unidentified source of this mass is generically known as dark matter. The problem is, the dark matter isn't dark. If it were, it would cast a shadow - like the moon casts a shadow on the earth during an eclipse. Rather, it's transparent, like glass. You can't see dark matter not because it blocks light, but because light goes right through it.

Of course, sometimes physicists give names to new phenomena just for fun. The names for quarks are quirky: "strange", "charmed" , "truth" , "beauty". One new hypothetical particle (a popular candidate for dark matter called the "axion") was named after a laundry detergent.

And why not? After all, putting the precise mathematical meaning of physics into images understandable to the human brain always loses something in the translation. Pinning them down with words is like trying to put your finger on a snowflake. The more precise you try to be, the more the meaning fuzzes out.

Perhaps, that's why physicists don't feel bad about changing meanings from time to time. They were only approximations to begin with.

"One of the slippery things we do in science is we keep redefining words ... as we learn", says physicist Helen Quinn of the Stanford Linear Accelerator Center.

One of the most egregious examples she cites is the word "matter" itself. Textbooks define it as that which has mass and takes up space.

That's good enough for chairs and planets and even atoms. But what about particles like neutrinos, which may have no mass, or electrons, which take up no space?

"We have changed the rules of the game", said Quinn. "Now matter is defined as baryons and leptons".

Lepton and baryon might not be words everyone can warm up to. But I'll take them over complementary schismogenesis any day.