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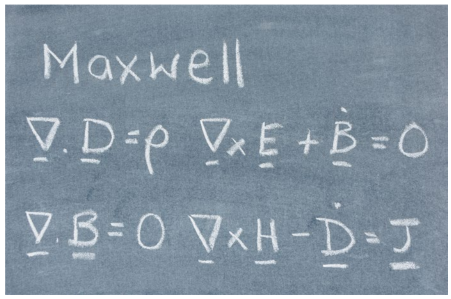
What's in a name?

The common practice of naming equations, effects, constants and units after individual scientists has its downsides, and it's time to rethink it.



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Around the world, physics students leave university not just with a degree, but with a working knowledge of Newton's laws, Maxwell's equations, Avogadro's number, the Hall effect, Brillouin zones, Reynolds numbers, the Schrödinger equation, Heisenberg's uncertainty principle and the Higgs boson. They will also use volts, ohms, hertz, tesla and ångström without a second's hesitation. Like most of us, they probably never stopped to consider why a discipline that generally eschews a historic approach to teaching is so keen to name equations, effects, constants and units after people.

Of course, these choices are not random but mean to honour scientists for their contributions to scientific discovery. For example, calling the SI unit for an electrical potential 'volt' acknowledges Alessandro Volta's pioneering experiments on batteries. Although it is proper to give credit to researchers for their work, one cannot help but wonder if this naming practice is still fit for purpose in the twenty-first century.

Today, researchers are unlikely to conduct their work in isolation, whether they are a member of a small university group with one principal investigator and two PhD students or part of a collaboration numbering thousands of researchers sharing access to large-scale facilities such as particle colliders or satellite missions. As such, giving credit to one — or even a few — people by attaching their names misrepresents the way science works. It overlooks the invaluable contributions made by students and postdocs, as the eponymous recognition is likely to go to the principal investigator(s) alone.

Indeed, more modern eponyms, such as the Stern–Gerlach experiment or Hong–Ou–Mandel interference, are often hyphenates to recognize multiple contributions. But is modern scientific collaboration reason enough to question historic attributions? After all, Isaac Newton is the sole author of the *Principia Mathematica*, just like Erwin Schrödinger, Edwin Hall and James Clerk Maxwell are of their respective papers.

And yet, even Isaac Newton — not a man known for his readiness to share — acknowledged that he could only make his discoveries by "standing on the shoulders of giants". Synthesis of existing knowledge into new ideas is certainly no mean feat, but it still calls into question the notion of single-handed discovery, or indeed singular discovery by disregarding previous or concurrent work from elsewhere in the world, possibly in a different language.

Take Maxwell's equations. Their commonly used form of four vector differential equations (pictured) is nowhere to be found in Maxwell's original 1861 paper. Instead, his formulation consisted of 20 differential equations with 20 variables. It was only two decades later that Oliver Heaviside used vector calculus to render them into the quartet physicists recognize today. To complicate the nomenclature even further, each of the four Maxwell–Heaviside equations has its own name, honouring yet more people — Gauss's law, Gauss's law for magnetism, Faraday's induction law and Ampère's circuit law. What started out as simply 'Maxwell's equations' turns out to be a veritable Russian doll of eponyms.

As interesting as it can be to peel away the layers of an eponym, this naming practice has (unintended) consequences, particularly in the context of teaching science. Physics curricula at school- and university-level rarely feature much history of science, but rather stick to teaching scientific facts. Students are thus left to glean a story about how science is done from the historic people they encounter in class because their names are associated with effects, equations, constants and units that paint a picture of exceptional men — and it is mostly men — mostly white, nearly all from the global north. It's no surprise that students from minoritized groups feel alienated, even if they love the subject they are studying.

Is there a way to change this implicit narrative? The most obvious step may be to stop naming scientific entities after people. In light of the more collaborative nature of modern science, there is certainly an argument for this approach. However, that also risks cementing the picture that science is done by white men because observations by today's somewhat more diverse scientific workforce would not gain equal footing with historic discoveries.

Maybe a better way to tackle the issue is to approach it from an entirely different angle and treat named equations as a form of jargon. After all, a person's name does not convey any information about the content of an equation to the uninitiated. Physicists know what Schrödinger's equation is, but a more descriptive name such as 'quantum wave equation' would not require the internal glossary learned at school and university. This is particularly important when it comes to more specialized terminology beyond the average undergraduate degree, which can alienate physicists with a different specialty regardless of background and gender.

The names of physical effects and equations are not set in stone. They are a community consensus based on a tradition to give due credit, which is arguably unfit for the twenty-first century. And it will take a community effort to rethink and change this practice. It is unclear how future scientists will look back on textbooks and papers peppered with names of physicists dead and alive, but it is clear that this familiar shorthand has negative undercurrents. Is the objective to give due credit worth perpetuating an outdated image of how physics is done and who does it? It is time for the physics community to follow other disciplines (P. Guedes et al., *Nat. Ecol. Evol.* https://doi.org/10.1038/s41559-023-02022-y; 2023) and have this discussion.

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