

Behind the Guesses

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Why I'm starting this blog



Figure 1: How physics does *not* work. Comic (cropped) from [1].

If you sit in enough physics, and to a lesser degree mathematics lectures, and/or read enough books, you're bound to encounter the phrase "We guess the solution..." Or, "If we define...it turns out that..." Now, this is not inherently problematic. After all, if the goal is only to solve some problem which does not have an obvious solution, or prove a random mathematical statement, these approaches will suffice. Then, the student or reader, assuming they memorize the solution (or remember where to find it), will now be exquisitely equipped to solve exactly the same problem.

However, this approach does not teach students any skills, tools or methods for approaching new and exciting problems. Additionally, I find, it is difficult to gain any meaningful understanding of the material through the "Guess and Show" method. It's possible that for many people definition is the same as explanation, but from my personal experience, and from discussions with other students, it seems that such people are not the majority of physics students.

So I'm starting this blog to attempt to show some of the reasoning that goes into these guesses. After all, the great physicists didn't just pull their solutions out of their butt, see Fig. 1. Even if getting the correct solution ultimately was a result of guesswork, physicists don't sit around solving problems by randomly throwing darts at variables to see what sticks.

Now, I am *not* claiming that science should be taught according to the historical development of the theories. In fact, usually doing that leads to needless confusion. What I am saying, however, is that even if we know the answer already, it is still essential to explain *some* rationale as to why such an answer makes sense – even if it’s not the original idea behind the guess.

What to expect

So what can you expect to see on this blog? Well, a lot of quantum mechanics, to be sure. The conceptual difficulty and widespread lack of understanding,¹ of this subject, together with the plethora of “known solutions” make it a prime target. But I’ll hopefully cover topics in electrodynamics, classical mechanics, thermodynamics, and so on. Maybe even some mathematics, if I’m feeling up for it.

In general, I will not carry through the solution to the end; you can always follow my references to see the complete thing. Instead I will try to provide some physical or mathematical reasoning behind some so-called “guesses” which “turn out” the correct solution. Additionally, with each post I will try to highlight a key **methodological point** that going behind the guesses gives us. These points will be **written in a different typeface** to easily spot.

I do not expect to always get things right. This is a learning experience for me, too. If I make mistakes, please point them out in the comments or email me. If I make corrections, I will leave the original, unedited version up as reference – sometimes we learn more from mistakes! I will try to post about once a month until I run out of ideas. I suggest you use one of the subscription options on the side so you don’t have to keep checking the site to see if I’ve updated. So, if you have a particular solution (or problem) that’s always bothered you, let me know, and I’ll see if I can come up with something. And if I can’t I’ll post it anyway, and we’ll see if anyone out there in the vast Intertubes who stumbles across the blog can help out.

Each blog post will have a link to a nicely formatted PDF with the same content. Come back here this Monday (March 30, 2009) for my first real post.

References

- [1] Z. Weiner. Saturday morning breakfast cereal [online]. March 2009. Available from: <http://www.smbc-comics.com/index.php?db=comics&id=1452> [cited 9 March 2009].

¹I don’t claim to understand quantum mechanics. But at least I don’t pretend to.