

What is special about your approach to studying?

I think, not so much is special, but there are some ideas that I use, and to explain them let's look at the following two examples.

- A long time ago during my school time and during my first years of my bachelor's, I was asking myself a question "how to be a genius like Landau and Feynman, who could not only do successful research but also solve many problems in nearly all parts of physics?" There are many ways, how I can answer it, of course, the main and the most important answer is that one needs the proper amount of time and practice. But not all of us with practice are gaining knowledge, so there are some other key ingredients, what are they? We know that these people had a clear vision, which topic connects with another topic, which method is used for which case, and what is a big priority and what is not so important. In other words, they structured all knowledge in their head. They created in their heads a well-developed book that they followed, using, and having a lot of practice. Also, as it is easy to imagine, the typical work of such geniuses has the following main parts: developing new theoretical concepts or laws, solving problems for practice, and mastering skills, and for it there was a time for understanding key ideas of new advanced methods, as well as the main laws of any part on which they had worked. So their "book" in their head had had the following most important parts: summary of main formulas and results, main theoretical concepts, problems for illustration of main methods, and other methods. I write these parts in the order of frequency of usage, so we can expect that the order of such parts in the "book" is the same. Now, we also know, that there were no computers during that time, so it was impossible to make such a book real. But in the 2020-s we live in the digital era, so a long time ago I thought, why not just follow their example and create such a book digitally? And it turned out that technically (in terms of Latex and typing) it is not so hard, but one would need to work and think a lot to do so.

- The second example, that illustrates my approach to science was inspired by the book of Laozi "Tao Te Ching". I was even assured that I saw it there, but I didn't find it, so it is my idea that illustrates one of the most important concepts of gaining mastery. Imagine our potential as a big bowl and mastery is a water that one wants to fill into the ball to be a master. Then, to do it one shouldn't run and try to find water, but just make the bowl open and under rain. Then it will be filling and over time it will become filled. In other words, one needs to organize a whole life such that he can gain experience by now doing much for it. I see this concept as powerful, so I even added a picture of a cup in the background of this paper. So, in order to have a lot of experience we should be ready to obtain it, we should have some approach to learning key results if there is a real opportunity to learn it. From school, we mastered learning through writing paper notebooks, but it is too uncomfortable and too time-consuming. We could do it in our head, but approximately always there is no time to think about some good ideas properly, so keeping information just in our head many times is not an effective idea. Instead, we can create digital notes, which is very easy, so with such notes, we can easily modify if we have some new experience, by just living our scientific life and practice mastery will be gained steadily.

I could explain other very important reasons, why such an approach is useful if used properly (like increased motivation, ability not to collect a lot of paper, increased control of prioritizing), and explain important features, how to make such an approach work, but there is no need for it. It is important to think more not about learning physics, but about nature and practice presence, and all understanding of science comes first of all with a lot of practice. However, I believe that this approach will be very helpful for creating a theory of everything since it allows to structure of thousands of theoretical works about it. At least it will be interesting to see, and if it is not helpful, why not?

How to create such notes?

Creation of them requires a lot of thinking and a lot of time. Thinking about how physics works and how problems are solved is the most time-consuming and typical activity for creating them (not writing). But, besides this, writing can be done with the following algorithmic steps (I assume that

one didn't learn already the subject, otherwise creation is obvious):

1) Create a \LaTeX file, with a first section of summary, a second section with the main theory, a third section with problems, a fourth section with additional theory, and a fifth section with organizational considerations. The structure varies from one field of science to another, but approximately it is the same. Often I also create a section with a summary of special topics, because otherwise, the first section becomes too big. This file is our "bowl" from the analogy above.

2) Make some structure of the first section, theory, and problems based on a book. Basically, just copy a table of contents.

3) Add some problems and add some key formulas to the first section. "Mathpix" is very helpful in this. It is important not to add a lot of text and explanations to the first section, since then it will be more energy taking to revise it.

4) All steps above will take approximately 25 minutes for one who got used to \LaTeX . Then we start thinking and sometimes adjusting the note. It is important not to write a lot, since if one doesn't understand the subject, he/she will write texts, which will be useless and later be fully deleted. So, we think about problems and modify the summary of key ideas and formulas. This work is our "putting the bowl under water and letting it fill up" from the analogy above.

5) After some work we understand some theoretical concepts and some unanswered questions appear, so there is sense to work on theoretical sections. One could start doing it from the beginning, but in many cases, it could be not needed, since there a way there will be no time to finish them, so I don't recommend doing it by default. So, then work on the theoretical section starts, for which I can recommend using Snip.Mathpix to add theory from well-established books or to download lecture notes from arxiv.org as .tex file (if they are posted there). Then theory will be modified by, for example, the addition of some explanations, and examples, posting some unsolved questions and ideas of solving them. It can be done by well-structuring notes, using `\subsubsection`, `\paragraph`, `\subparagraph` environments. It is important to name such theoretical section by the author/s of the book, in order not to confuse yourself later. I want to emphasize, that such theoretical work takes a lot of time and in many cases is not needed, so these sections if created often for a long time remain very similar as in good books. Still, it will be more comfortable to read all the information from one book, where it is very easy to make modifications than to have several books and some paper notes with thoughts about it.

In terms of programs, I use most of all pdfLatex, Texstudio, Windows shortcuts for text editing, Notepad++, MathPix, Arxiv-s .tex sources, git, and Python code for replacing text.

The last thing I should mention, that if one decides to work this way, there will be several not so comfortable hours during first several months (this can be up to first year), because of \LaTeX and general understanding how to write texts and structure information. But still, after a long time this transition period seems not so big.

How much time one needs to work with such approach to master physics?

"Mastering physics" is a broad term and it depends on the goal one sets. Becoming a professional in general takes decades, and such an approach gives a lot of advantages, but still, the time is still at least time to get a P.h.D. degree (4 years of Bachelor's, 2 years of Master's, 4 years of P.h.D studies). Also, several years of work are needed to get comfortable with such an approach. Actually, the creation of such notes is just a way of working, so nothing is very new about it. Personally, after more than 4 years of working in such a format (by summer 2024), I can see that they give more focus of attention, more motivation, and allow easier draw conclusions from problems for practice that were solved successfully or unsuccessfully. In terms of time I can't tell, that there are some differences, because, from one side, structuring information allows us to move further and not become crazy, but from another side, it takes time (it was so especially during the first year of creation of them).

Are your notes ready?

No. The only reason I make them publicly available is because I am in search of a PhD position or a job, or to share them with friends. There is no intent for any other person to read them. These notes are life-long projects, or at least one should work on them and learn a specific field of science for 10 or 15 years. It is very hard to finish them even during PhD studies, and in 2024 I am still a master's student. I would like to be in future a professor of physics, who can answer questions and solve many problems, and by the time I finish the notes, I'll be on such a level.

Why is some text written in Russian?

Unfortunately, making notes takes a lot of time even if one prioritizes his activity. Moreover, it is tough to do at least something notable in the creation of notes if one is involved in research (and I am since I have a master's thesis to do). So I don't have time to rewrite what I wrote during my Bachelor's in MIPT (where we had an education in Russian). Another reason is that sometimes books are not available free in English, but available in Russian, so I use them and I take theory from them to my theoretical parts to work with it further. Another reason is that sometimes it is less energy taking from me to write in Russian, especially if I am following a book in Russian.

Is this approach useful in research?

The results of research depend on a lot of background and supervisor (if one doesn't have a P.h.D. degree), so despite such an approach being a general advantage, results of research during the first year are determined by a general level and conditions. However, in the long run, it should also help a lot in research (but currently no one has tested it yet).