

Where is Physics in Contemporary Physics ?

By Benjamin Wagener on Friday, February 18th 2014.

It is indeed a serious question to ask. Contemporary physics is full of various kinds of Mathematics but Physics has never been Mathematics at all. Mathematics appears to be the proper language of physics because of its flexibility and accuracy but on its own it has nothing to do with Physics at all. Physics deals with the understanding of natural phenomena, not directly with equations, geometry or numbers. The problem is that while a lot of physicists nowadays train and try themselves on complicated Mathematics, it seems that they completely forget to really do Physics. This is especially true in current Theoretical Physics where it can be said clearly that most theoretical physicists do Mathematics but not Physics. Doing a good Theoretical Physics would require to deal deeply with the understanding of natural phenomena, to deal with deep physical principles and then to use Mathematics as a modeling tool. This is not what most physicists do nowadays and this is a serious problem for current Physics and for the future of Physics.

Doing Mathematics inside Physics seems to be very attractive. The modeling of Physics by Mathematics permits theoretically to predict new phenomena with an accuracy that would have been completely out of sight otherwise. Nevertheless, the level of complexity that the Mathematics involved in current Physics is so deep that many Physicists spend a lot of their time learning Mathematics. The problem however, is that most Physicists are not skilled enough in Mathematics to do it properly.

On the other hand, Mathematics within Physics may appear so complicated that many Physicists do not understand it or they spend their time strictly with Mathematics and do no Physics.

To take the example of Albert Einstein because it is desperately unknown: Albert Einstein was first in my opinion a great scientist interested especially in the natural Science called Physics. If one looks more carefully at what Albert Einstein did, what is the most astonishing in his work is the depth of his scientific work and not at all the complex mathematics he used to build his theories. From Special Relativity in 1905 to General Relativity in 1915 through the description of various physical phenomena like the photoelectric effect or his work on the Brownian motion, Albert Einstein was systematically quite obsessed by the rigor of his scientific insistence with respect to the understanding of natural phenomena. With respect to this, the complex mathematical structures he has used in order to build relativity are completely secondary. These Mathematical methods were

necessary but the heart of Albert Einstein's genius was clearly the depth of his scientific work. When looking more carefully at his articles, one could see how much he was concerned with scientific rigor and scientific thinking and how he used Mathematics mainly as a tool. Many in the time of Albert Einstein asked about the sense of his theories and many until now ask how he could have done this and why it was so right. Well, I would answer that Albert Einstein had almost no doubts, with a scientist quite like himself, the scientific rigor is so deep and tight that he could only be right (somewhat).

The problem is that something like this is not so appearing and many remind themselves that Albert Einstein was a kind of scientific sorcerer that revolutionized physics out of nothing. This is a big problem in current scientific beliefs and in what the common public can think about physics and about sciences in general. The problem is that with such false belief that doesn't see the true Science, Physics is going nowhere.

It is extremely important for the future of physics that the scientific ethics, rigor and thinking be replaced as fundamentally important. Even amongst physicists and so not only amongst the common public, many imagine various things and try themselves by building nonsense theories. And I insist about this last point because it is something quite common even if it can be hidden behind very complex structures and very complex Mathematics.

These scientific ethics are something extremely important for physics. It is the only way that physics can evolve properly avoiding centuries of nonsense. Physics is concerned by natural phenomena, therefore those natural phenomena should return to the heart of Physics and the scientific rigor and ethics will do the remaining.

This text is very short but there is in fact a big problem. I am mainly a Mathematician but first wanted to be a physicist and indeed I did a lot of Physics. The big problem is that a lot of Physicists do not even realize themselves that they do not do Physics. There are complex reasons for that and also very clear complex psychological and societal phenomena. But Physics should stop being Mathematics. Things should be stated at their proper place in Physics and the contemporary physicist should be truly concerned with Physics.

This is something that seems especially complicated in modern physics because the phenomena that are now studied are very complicated to conceptualize. Moreover, such ideas may be sustained by the false ideas that such phenomena cannot be conceptualized because modern physics put a serious obstacle on usual observation. However, people like Copernicus, Galileo, Newton, Einstein and indeed many others believed in their time that this was possible to do and so they did.

If we want to make modern Physics progress, a serious change in the minds is necessary and a serious concern about true Physics should return with deep rigor and ethics.