

Reports on
“Making Sense of Quantum Mechanics”
Chapter 1
Student in an Elusive Wonderland

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1 What the book is about

Time after time, we hear that “Nobody understands quantum mechanics”; I have always believed that it is not, at any rate, an honor but rather a “complacency that comes with diminished ambition”, to quote Steven Weinberg [1]. The first section, by giving the reader a glimpse of most strange and elaborate convictions of quantum physicists, tries to cast serious doubt on the over-emphasized role of observer and observation in the orthodox interpretation of quantum mechanics; The eminent Mathematical Physicist Jean Bricmont presents two mysteries tied with quantum mechanics as following:

I) Possibility of having mutually exclusive properties of quantum mechanical objects and the fundamental role of measurement in having definite properties, “... *The electron is forced to make a decision...*” This view of Pascual Jordan is usually merged into the vague statement of Bohr’s Complementarity –which I have never understood what it *exactly* means!–.

II) Non-locality, “*spooky action at a distance*”, which author claims it is indeed what we should, and in the shadow of the first mystery forgotten, to *take home* from all the business of quantum mechanics.

Following the dialectic, Bricmont in section 2 tries to give a sense of the vague meaning of the Copenhagen school of thought, “... *Whenever reference is made to ‘Copenhagen’, that stresses the central role of observations in the very formulation of quantum theory*”. He aims to show us how absurd the arguments of the defenders of Copenhagen school can be, not only on quantum mechanics but also on the whole enterprise of science, in order to clinch the old and deep objections of people like Einstein and Schrödinger, clarifying Einstein’s position on the argument: “*The root of difference between Einstein and the Copenhagen school*

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of thought was exactly about this **issue of completeness**: Einstein thought that the existing quantum mechanics was incomplete, i.e., that a more detailed description of the microscopic world was possible and that such a description would eliminate the need to refer to an observer”. While Copenhagen school defenders claim themselves to be ‘hardnose scientists’, as a student, I have always wondered about how much the whole teaching of quantum mechanics is rather a business of faith! It is not that you are expected to accept some statements, it is that you are expected to *believe* a whole doctrine which you do not have the slightest clue what is it all about! –implicitly you are made a positivist and even an idealist after taking a conventional course on QM–.

2 What Do Physicists Say Now?

“Kids, start developing your quantum intuition now, before it’s too late!”

—Sean M. Carroll, facebook post

Much the same as what they used to say!

Every serious student of Physics or Mathematics, by choosing to study science, aims to understand and explain the objective world. *“Whence come I and whither go I?”*

We have heard, time and again, the assertion that *“We do not explain ‘the world’, we only predict the results of ‘experiments’ ”*; Least of all possible world-views, being a pragmatist, it suffices to believe in an objective world, otherwise why not study engineering after all? There should be no virtue for scientist in a world where we only predict the results of experiments. We, as followers of science, in search of the truth, have always claimed and indeed believe that we are only satisfied when we find a complete *explanation* of the world. Nothing else, except truth, can provide enough motivation and perseverance for me, personally.

Bricmont insists that the situation has not changed very much since the very beginning of Copenhagen school; Yet, there is still hope in understanding QM since there are still people who want to understand the whole picture of the world, no matter how ‘senile’ they may be called. That is when, by turning into the *good* people of the story, Bricmont admires the people “ who ‘took off’ the train of quantum mechanics”, to quote Leon Lederman [2].

3 Why Bother?

*“So irrelevant is the philosophy of quantum mechanics to its use, that one begins to suspect that all the deep questions about the meaning of measurement are really empty, forced on us by our language, a language that evolved in a world governed very nearly by classical physics. **But I admit to some discomfort in working all my life in a theoretical framework that no one fully understands...**”* —Steven Weinberg [1]

Bricmont, by building a whole worldview upon objective realism, strives to reason that taking the whole burden is necessary; that we should be inclined to resolve the old problems of quantum mechanics once and for all; while he admits our probable limitations, he is rather ambitious in his enterprise and at the same time insists on mere reasoning, no matter for or against his arguments: “... *That may be the case, but one needs some argument to show that and not simply rely on the ‘rhetoric of inevitability’* ”.

References

- [1] Steven Weinberg, *Dreams of a Final theory*. Vintage, 1993.
- [2] Leon M. Lederman, interview in *Van de Schoonheid en de Troost* Series, 1999.