

Title: Realism and Quantum Mechanics: A Methodological Lesson from Intertheory Relationships.

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Abstract: In this paper my intention is to analyze how the hypothesis of intertheory relations affects the possibilities for approaching the so far unsolved problem of the realist account of quantum mechanics (QM). One can classify the well-known interpretations (Everettian, Bohmian, and GRW, just to mention the most popular ones) by asking what is the intertheory approach that they adopt. Questioning this –so I argue– highlights the dominance of a broadly construed reductionist framework, where a central aim is to ‘explain the appearance of the classical world’. I think that this results in metaphysical constraints for the realist. I will attempt to elaborate an alternative methodology where the most important aim is to interpret QM, rather than satisfying reductionist-oriented intuitions.

In the first part, I will recall central issues of intertheory relations in physics, focusing on the problem of the quantum-classical limit. I will assess how the different interpretations of QM stand in this regard. At the meta-level, these research programs involve philosophical commitments that can be challenged and revised. In the second part, I will briefly present Bokulich's interstructuralist approach to the quantum-classical limit as an alternative view to reductionism. Bokulich provides an original form of explanation for phenomena at the intersection of quantum and classical domains, but at the philosophical cost of leaving the foundational problems of QM, and the more general discussion of realism, untouched. I will end by presenting a framework of intertheory relations initiated by Heisenberg; the ‘closed theories’ view. Whilst it faces important internal challenges, I will argue that it enjoys some promising characteristics as a philosophical strategy to articulate a realist account of QM. Particularly, I will argue that in virtue of its take on intertheory relations, a view similar to ‘closed theories’ would be attractive for the realist who wants to articulate the metaphysical content of QM. I will not solve this huge problem, but I will suggest that appealing to the metaphysics of powers could represent a step forward.