The case against quantum fundamentalism

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Abstract

Quantum fundamentalism is the view according to which everything in the universe (if not even the universe as a whole) is fundamentally of a quantum nature and ultimately describable in quantum mechanical terms. This widely held view, with its associated reductionism, is opposed by Niels Bohr's conception of quantum mechanics – not least because of his insistence on the necessity of classical concepts in the account of quantum phenomena.

In this talk I first outline Bohr's reasons for this insistence on classical concepts, and show that they are closely related both to a 'dissolution' of the quantum measurement problem and to a classical description of the space-time reference frame needed in quantum experiments. I then defend the need for classical reference frames and argue – within the context of a relational understanding of time – that classically described clocks may well be necessary to make sense of the (classical) time parameter in quantum theory. Using this relation between classical time and clocks, I finally indicate a sense in which also the classical physics' notion of causality may be presupposed in quantum theory.