**ABSTRACTS**

**C2.12 Philosophy of the Physical Sciences**

**Quantum Mechanics and Scientific Realism: restoring a misconceived relation**
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The paper aims at examining the controversial issue of a realist approach of quantum theory. To this end, it is maintained that the novel character of quantum theory appears ‘paradoxical’ only when it is contrasted to our classical intuitions and prejudices; however, when independently evaluated, it manifests obvious explanatory virtues. Secondly, it is argued that the notion of ‘local realism’, as it emerges from the analyses of Bell and Kochen-Specker theorems, has significantly influenced our view about realism and quantum mechanics. Finally, after the exposition of the current view of scientific realism, the paper defends the thesis that the realist approach to quantum mechanics is possible despite its unquestionable novel elements and even if the issue of its interpretation, for some philosophers or scientists, is still disputed.

The epilogue draws the conclusion that quantum physics succeeded in changing our view of the world, yet did not substantially change our philosophical outlook about scientific theories, whether realist or antirealist.

**(Dis)Solving the Measurement Problem**
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In this paper I will argue that the Measurement Problem in Quantum Mechanics is a pseudo problem, caused by an inappropriate characterization of the measurement apparatus. Following Ladyman and Ross's thesis of the scale relativity of ontology, their remarks on the Measurement Problem (Everything Must Go, OUP: London, 2007), and also more traditional philosophical work on vagueness, I will argue that the measurement apparatus cannot be represented by a pure quantum state. Therefore the coupling of a Quantum Mechanical system S and an apparatus A will not be represented by an entangled state. Thus after a measurement A will not be in a superposition, but will rather be better represented by a mixed quantum state. As the indeterminacy here is epistemic in nature, the Measurement Problem will not get off the ground.
On the notion of a-spatiotemporal beables in quantum gravity, or: Can we dispense with space and time as fundamental categories?

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One of the most remarkable contentions in the research for a theory of quantum gravity (QG) is that spacetime might not be fundamental, but "emergent" from an ontological ground floor made up of a-spatiotemporal elements of reality. However, there is some philosophical resistance over this view based on the fact that such alleged building blocks of spacetime are usually represented as quantum superpositions of abstract mathematical objects (e.g. spin-network states in loop QG). Given this fact, it is difficult to provide these elements with a sharp metaphysical characterization. With this respect, it is not sufficient to say that spacetime simply emerges from a probabilistic cloud of a-spatiotemporal elements, since any sufficiently worked out account of emergence (e.g. in terms of causality, supervenience, or ontological grounding) heavily relies on pre-existing spatiotemporal notions. On the other hand, such a skeptical attitude is usually accused of being unreasonably attached to intuitions, and seeking to force a "folk" picture in terms of outmoded Aristotelian categories - such as space and time - upon modern physics.

The aim of the paper is to enter the above sketched debate by considering the question whether a metaphysics that acknowledges the primacy of physics over the special sciences could dispense with space and time as fundamental categories, and by what means it might do so. A special emphasis will be put on the notion of local beable and its role in bridging ontological and empirical aspects of a physical theory. In particular, it will be discussed what kind of modifications such a concept should undergo in order to fit the QG context. Finally, a tentative proposal will be put forward concerning the minimal metaphysical requirements that beables for a theory of QG should meet in order to be considered genuine elements of reality as opposed to mere abstract elements of the formalism.