AGPhil 6: Quantum Foundations 3

Time: Wednesday 16:00–17:45 Location: JAN/0027

Invited Talk AGPhil 6.1 Wed 16:00 JAN/0027
The structure of entangled properties: Distributional holism
— •Paul Näger — University of Münster, Germany

Which options does a wave function realist (GRW, Everett or other) have to understand entangled quantum states as referring to properties? Since entangled states cannot be reduced to the micro states, the denoted properties must be ontologically irreducible in some sense. There are three major proposals: Either an entangled state refers to an irreducible property of the macro object (as proposed by wave function monists), e.g. "having total spin 0"; or it refers to an irreducible relation between the micro objects (as proposed by some ontic structural realists), e.g. "having opposite spin to"; or, less well-known, it denotes a plural property of the micro objects, e.g. "having total spin 0" understood as a *collective* property of the micro objects. I argue that all three established proposals fail to properly fit with the structure of more general entangled states and develop a new proposal: An entangled state denotes what I call a "distributional property", establishing a specific kind of holism with a characteristic structure.

AGPhil 6.2 Wed 16:45 JAN/0027
The Self-Interaction Problem as the Measurement Problem of Classical Electrodynamics — •Mario Hubert — The American University in Cairo, New Cairo, Egypt

The self-interaction problem is the foundational problem of classical electrodynamics. Although it has been recognized for around 100 years, it has not been satisfactorily solved so far. I argue that the formulation of the problem actually determines how successful solutions may look like. Indeed, I show that the formulation of the self-interaction problem surprisingly parallels the formulation of the quantum mechanical measurement problem. Although Frisch (2005, Ch. 2) presents such a formulation, I criticize his list of assumptions, as well as his proof. The problem, as he sees it, relies on an inconsistency of energy conservation, while I argue that the problem is more severe: the fundamental equations of motion for a charge affected by its own electromagnetic field break down.

Having shown what the self-interaction problem actually is, I then present different strategies for its solution. My focus will be to retain the electromagnetic field with point charges. This strategy has not yet received sufficient attention.

AGPhil 6.3 Wed 17:15 JAN/0027
Quantum Theory Is Not As Strange As We Think (or is classical physics stranger than we think?) — •Fedde Benedictus — Utrecht University, the Netherlands — Amsterdam University College, the Neterlands

Quantum theory is conceptually closer to classical physics than is usually understood. I will discuss two of the characteristics of quantum theory that, at first sight, seem to set it apart from classical physics, but on closer scrutiny are not so different from their classical counterparts * locality and quantization.

To argue my point, I will show that:

1) While gravity in Newton*s theory is notoriously non-local, Einstein wanted nothing to do with this non-locality. However, Einstein's understanding of gravity as a metrical concept cannot fully do without non-locality: any interaction that is strictly local is restricted to a mathematical point (and therefore can never be between objects of finite size).

2) The atoms and molecules in classical physics are quanta of mass. Not only does this show that quantization plays a formative role in classical physics, it leads to the remarkable suggestion that the very idea of quantization (in the form of a fundamental symmetry) is essential for any description in terms of mathematical regularities.