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Philosophy 596H

WHAT THE QUANTUM FIELD IS (...A FIELD)

In chapter five ("What the quantum field is Not") of *An Interpretative Introduction to Quantum Field Theory*, Paul Teller sets out to show that quantum field theory is not a true field theory, a rather humorous statement for a book with such a title. While he may be justified in saying that Q.F.T is not a *classical* field theory, in that it doesn't assign real *values* to each space-time point, I feel his argument in saying that the quantum field is not a true field is unjustified and unnecessarily complicates the issue.

Teller starts this digression by stating that 'quantum field theory' need not be presented as a field theory and asks the question "why then is the subject so called"¹ But this question can be asked of any field theory. We did not need to define the electromagnetic or gravitational fields, it just simplifies the physics. The field is just a tool physicists invented to help facilitate our understanding of hard to swallow concepts such as 'action at a distance'. It virtually takes on its own reality, independent of the object that created it, as the force laws become so complicated that they are impractical. To quote Feynmann, "When the forces get more complicated, the field becomes more and more real, and this technique becomes less and less of an artificial seperation".² The reality of the field comes in our mathematical modeling. But as a physical being it is deceptive. If Newton is consistent than "the claim that we know how bodies can interact by contact, or more specifically how they can communicate motion in impact, in any other sense than that we have observed interactions of this type to occur, must be delusive".³ The field is defined how we choose and if we wish to extend it to quantum physics we are free to do so. The important thing is that it works.

