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Quantum field measurements without superluminal signalling

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Although quantum field theory inherits much of the basic structure laid out by the postulates of ordinary quantum mechanics, it is known that the measurement theory cannot go through unscathed. There are examples of idealised measurements in quantum field theory which produce superluminal signalling. These examples indicate that endowing quantum theory with a relativistic spacetime structure restricts the set of admissible quantum operations. There is, as of yet, no characterisation of these operations. To this end, here we proceed to clarify the causality issues which arise in measurements of quantum fields, as well as characterise a class of permissible measurements.

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