

**Robert B. Griffiths**

Carnegie-Mellon University, USA

## **Quantum measurements and contextuality**

Quantum contextuality has to do with measurements of a collection of quantum observables, not all of which commute with each other, and hence cannot all be measured simultaneously. Bell (Rev. Mod. Phys. 38, 447, 1966) posed the following question: If  $A$  commutes with  $B$  and also with  $C$ , but  $B$  and  $C$  do not commute, will the value of  $A$  measured along with  $B$  differ from its value if measured along with  $C$ ? If "yes", quantum mechanics is contextual in that the measured value of  $A$  depends on the context,  $A, B$  or  $A, C$ ; if "no", quantum mechanics is noncontextual. Using an analysis of quantum measurements not available to Bell I will argue that quantum mechanics is noncontextual. To be precise, if a measurement of  $A$  with  $B$  yields a value  $A = a$ , then had the same experiment been carried out with apparatus modified to measure  $A$  along with  $C$ , the same value  $A = a$  would have been obtained. More recent literature employs "contextual" with a different meaning from that used by Bell. Thus in a proposal by Abramsky et al. (Phys. Rev. Lett. 119, 050504, 2017) noncontextuality is associated with the existence of a joint probability distribution for outcomes of measurements of a collection of observables, not all of which commute. While this definition poses some interesting mathematical problems, I will argue that it is not related in any simple way to the physics of quantum measurements.