

AGPhil 5: Quantum Foundations 2

Time: Wednesday 14:00–15:30

Location: JAN/0027

Invited Talk AGPhil 5.1 Wed 14:00 JAN/0027
Physical probability is relative frequency — ●SIMON SAUNDERS
— Oxford University

Frequentism as a philosophy of probability is a perennial favourite among scientists, but for reasons I shall explain, has long been abandoned by philosophers of probability (physical probability, probability as something in nature). However, this consensus rests on the presupposition that there is only a single world. That assumption is challenged by the Everett interpretation of quantum mechanics, which is independently motivated. Understanding Everett’s branches in terms of decoherence theory, there is a ready candidate for an ensemble even in the case of a single experiment: the equi-amplitude branches produced on any given trial. Relative frequencies for ensembles like these agree with the Born rule. As I shall show, for ensembles of this kind, the usual difficulties that render frequentism untenable no longer arise. Arguably, all physical probabilities are quantum probabilities, so the account is quite general.

The argument is strengthened by a recent result due to Tony Short, where given the possibility of swapping branch amplitudes, a prob-

ability measure over an ensemble of branches invariant under swapping must agree with the relative frequency rule, for it must treat equi-amplitude branches as equi-probable. It must therefore agree with the Born rule as well. I conclude with a critical evaluation of the invariance condition, and a limited defence. This work extends my <https://arxiv.org/abs/2201.06087>; The paper by Short is at <https://arxiv.org/abs/2106.16145>.

Invited Talk AGPhil 5.2 Wed 14:45 JAN/0027
Locality and the Metaphysics of Many Worlds Quantum Mechanics — ●ALYSSA NEY — UC Davis, Davis, California, USA

Those who defend the Many Worlds Interpretation (MWI) of quantum mechanics often argue it is to be preferred over other solutions to the measurement problem because it provides a local interpretation. However, some have argued that the locality of MWI depends on the way MWI is itself interpreted metaphysically. This paper defends the locality of several metaphysical interpretations of MWI against recent criticisms.