

Written Assignment 5

- Either (a) Is the quantum-mechanical wave function an objective property of the physical world, or rather a measure of our state of knowledge? Explain, *in your own words*, the obvious difficulties with each view. (You are not necessarily expected to decide between them.)
- or (b) Imagine a fictitious hand grenade, initially at rest with a random orientation, which is constructed so as to explode into exactly two halves of equal mass. We do not know *a priori* the direction in which either half is ejected; but via conservation of momentum, a measurement of the direction of one half exactly determines that of the other, distant half, despite the fact that it is far away.
- (i) Does this state of affairs suggest that nature is “nonlocal”? Why or why not?
 - (ii) Why do the results of the so-called “EPR-Bell” experiments tell us something more than this?
- (You are *not* expected to derive the QM predictions for the experiments.)

[We will get to the EPR thought experiment in lecture 20 (Thursday, 30 Oct.), but if you are planning to do your term paper on QM you should already be reading about it.]

Please submit a double-spaced Word document (‘.docx’ or ‘.doc’) of 650-1000 words on Compass by class time (2p) on **Thursday, 6 November**.