

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? Present an argument in response, *in your own words*, and include the obvious difficulties with each view. (You are not required to decide between these two extremes, but should present an argument, whatever your view.)
- 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, 2 Nov.), 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 5p on **Thursday, 9 November**.