Equipossibility, over-inflated basket balls, photons and polarizers   Georgina Woodward   Oct 2022

Abstract
An explanation for the statistical results for photon and polarizer experiments, that differ from classical expectation and linear output variation with changing angle. Brief discussion of what is equipossibility. Basket ball inflation analogy used to help visualize the issue. Positing polarizers produce a population of photons with different wave component orientations with different ease of passing different orientations of polarizer, rather than a uniform population. In this way talk of the necessity for faster than light communication or need to abandon local realism becomes superfluous.

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Classical probability is the likelihood of an outcome where there is equipossibility. Such as the outcome of a die roll or choosing one card from a pack.
We can assume, near enough, equiposibility in some circumstances, where not strictly true, by ignoring small variables. Such as a light breeze over the basketball court, or stickiness of the dice rollers hand.

Lets think about when there isn't equipossibility. The chance of catching a fish of a particular species from a pond in which there are an equal number and size of different fishes and same rod, bait and angler is used. Sounds fair only different species have different bait preference. How about basket ball hoops, only the balls will have different inflation. Over-inflated balls will fit less easily though the hoop compared to normally inflated balls. Under-inflated may have different from usual flight characteristics. We can't make the assumption that each attempted hoop by a same player from the same position has equipossiblity of passing through through the hoop.

Now lets think about photons.
True a photon will either pass through a polarizer or it won't. We can say as much as a basketball will pass though a hoop or not.
There is a population of photons having different wave component orientations un-polarized. Half won't fit through a particular orientation of polarizer ,whatever orientation is selected. It is said that the polarizer produces 'light' of just one orientation parallel to the polarizer orientation- but is that true? We can test what emerges using a second polarizer.

Are we testing the diverse population of wave component orientations that's there, that made it through from the un-polarized input or making a singular uniform product population perform the limbo? If there is a uniform population why would only some proportion of them make it through at angles between the same as first polarizer and 90 degrees? Why don't they all pass or not pass. Not having a reason for that it is more reasonable that we are dealing with a diverse population which can pass through different orientations of polarizer with different ease. Does classical physics require the angle of second and ease of passage through polarizer have to be a linear relationship. I'd say no, because we are not dealing with more of or less of an equipossible happening.
At same orientation all pass, at 22.5 degrees almost the same 85 % pass, at 45 degrees 50% pass, at 60 degrees 25 % pass, at 90 degrees 0 pass. The smallest difference in orientation the least reduction in ability to pass. At 90 degrees there are no photons.

Comparing this to basketball over-inflation: A slight over-inflation makes little difference to a skilled thrower but making 'baskets' becomes more difficult as inflation increases. Until there is no difference between hoop and ball size and scoring is impossible. I do not know that this should be a linear relationship. It seems to me it may not be as we go from easy/ not much difference to a significant reduction in size difference of ball and hoop. This is a departure from the probabilities of equipossibility. Therefore classical probability should not be thought to apply.

True a photon will either pass through a polarizer or it won’t. However the assumption that any unmeasured photon has equal probability of passing a polarizer would be incorrect. In each case it is a maybe that depends on the relation of the existing *current* orientation of the photon wave component and orientation of polarizer when they meet. What that relation is depends on the particular photon out of a non uniform population.

This view requires thinking about photons as more than just indistinguishable identical particles. Does our inability to know the orientation of an individual photon wave component mean that the laws of conservation of linear and angular momentum don’t apply to photons produced as pairs? I’d say not. Existence and knowledge belong to different domains. What is known is irrelevant to the happening that precedes measurement perturbation.

Are the entangled photon pairs conspiring to produce results varying from classical probability? More likely it is a reflection of the statistical results seen in simple polarizer experiments. Talk of faster than light communication being necessary or local realism (i.e. local cause and effect and mind independent existence) being incorrect are superfluous. The results are showing lack of equipossibility has not been taken into account.