Re: Schrodinger, his cat, and the submarine ride

Source: http://sci.tech−archive.net/Archive/sci.physics/2008−03/msg00774.html

- *From*: cjpolins@xxxxxxx
- *Date*: Sun, 9 Mar 2008 14:12:50 −0700 (PDT)

On Mar 9, 1:28 pm, Marshall Dudley <mdud...@xxxxxxxxxxxxx> wrote:

> One fine day Schrodinger and his cat were invited for a submarine ride.
> Unfortunately during the ride, there was a malfunction in the ballast
> tank system, which resulted in them settling to the bottom of the sea.
> Fortunately there were scuba suits and tanks for everyone, so they could
> all escape unharmed. Unfortunately there were not any to fit the cat,
> and it didn't know how to use one anyway. Fortunately there was box the
> cat could be put in to take him to the surface. Unfortunately the box
> only contained enough oxygen for the cat to live for 45 minutes, but the
> trip would take an hour. Fortunately there was enough oxygen, supplies
> and time for Schrodinger to evaluate the situation and come up with a
> solution.
>
> Schrodinger installed in the box a radioactive source that would have a
> 50/50 probability of an atom decaying in an hour, with a detector and
> source of poison gas if a the decay was detected. He built the device,
> put the cat in the box and took it with him when he swam to the surface.
> At exactly an hour he opened the box, and as quantum mechanics tells us,
> he had a 50% chance of being happy the cat was still alive, or 50%
> change that he was sad it was dead. However he went on and measured the
> amount of oxygen left in the box to try to see when the cat died. This
> of course would not yield the answer due to the quantum effects.
> Instead he would measure the same thing, regardless of whether the cat
> died or not since the cat was not in a totally dead or live state during
> the time..
>
> Lets review what classical physics says the level would be (we are
> assuming for simplicity that the cat would use a specific amount of
> oxygen per unit of time, and once it hit 0 level the cat would die.)
> First if the cat was alive, then there should be, opps, the cat couldn't
> be alive. OK, when the box with the dead cat is opened, the oxygen
> level could be anything from 0, if he died at the 45 minute point, to
> 100% if he died as soon as the box was closed.
>
> However quantum physics tells us this is wrong. Depending on the
> interpretation of the equations, it could be any of the following (but
> will be the same regardless of if the cat is alive or dead when the box
> is opened).

1. 100% of the oxygen is still there because the cat was only a potentia during that time, and the potentia was neither dead nor alive, and thus could not respire.
2. The cat was a superposition of a half−dead and half−alive cat with only the half live cat respiring. Thus only half the oxygen would have been consumed the entire time, IE 22.5 minutes worth, resulting in 37.5 minutes of oxygen being left which computes to 62.5%.
3. The cat was a superposition of a varying amount of partly dead and partly alive cat, starting as a fully alive cat and as the probability that he was dead increases linearly with time until at 60 minutes when it reaches 50%. This results in half as much oxygen being used as in #2, so 81.25% of the oxygen is still left.

Note that NONE of the above use all the oxygen, so the cat could not have died from lack of oxygen, only from the quantum effect of the atom disintegrating.

Now there is another possible interpretation. The oxygen and carbon dioxide are also in a superposition as well, and they collapse into one of the two possibilities set for classical physics as soon as viewed. Opps, that's right there is only one possibility, and that is that the cart is dead. Hmmm, ok we measure the oxygen (or carbon dioxide level) before opening the box . That should correspond to one of the 3 quantum possibilities, since the wave would not have collapsed yet. But it would have to instantly change as soon as we open the box and look to the cat to the classical amount, and the cat would have to be dead. In that case, we would have two measurements of the oxygen or carbon dioxide levels one right after the other, where the levels instantly change. Is that possible? No, as soon as we measure the sample of gas it would collapse to the final state as well, which would be from 0% to 100% per the classical theory. Does measuring a sample of the gas, cause all the rest of the gas to collapse from the superposition as well? If it does, then wouldn't that mean that locality is violated? If it doesn't then wouldn't that mean that each sample would randomly have different concentrations? So we simply have replaced one paradox with another one.

So, is the cat dead for sure, or would it have a 50% probability of being alive? Can anyone unravel this mess?

Marshall

Marshal Schrodingers cat is thought experiment that is based on hocus pocus. I has no reality. It can exist only in the quantum realm,and in QM weirdness is in. Bert+Sunbeam
.