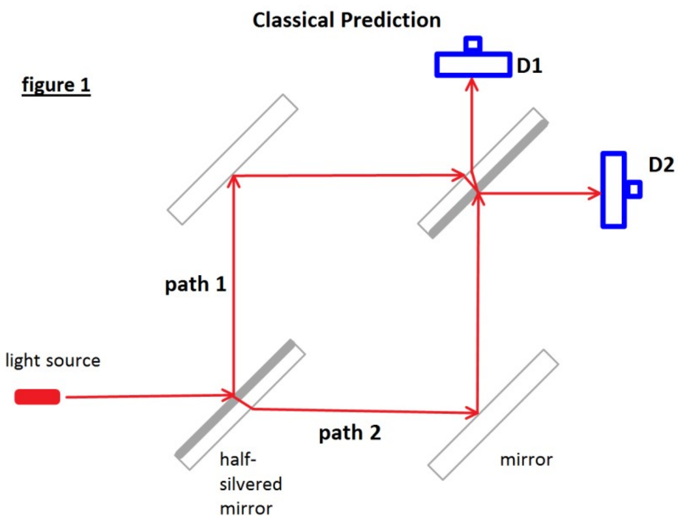
QGD Explanation of Quantum Entanglement Experiments

Preonics provides simple and realistic explanations of observations of so-called quantum entanglement experiments. Not only is QGD consistent with the experimental observations of so-called quantum entanglement experiments but, unlike quantum mechanics, precisely explains the mechanisms responsible for outcomes currently attributed to quantum entanglement effect without violating the principle of locality. The simple experiment below is an example of how to preonics can be used to analyse of an experiment and predict its outcome.

In the setup shown in figure 1, which is called a Mach-Zehnder Interferometer, we have a source of light which beam is split in two by a half-silvered mirror. The classical prediction is that 50% of the light will be reflected to the mirror on the top left (path 1) and 50% will be refracted to the mirror at the bottom right (path 2). The light which arrives at the top left mirror will be reflected towards the back side of the half-silver mirror on the top right where it will be split into two beams towards detector 1 and detector 2, each of which should be receiving 50% of the photons coming through path 1 or with 25% of photons emitted by the source.



The photons that follows path 2 (50% of the photons from the source) is reflected by the mirror at the bottom right towards the half-silvered mirror at the top right where it will be split into two beams each having 50% of the photons following path 2 (or 25% of the photons from the source beam). So classical optics predicts that 50% of the photons from the source will reach D1 and the other 50% will each D2. However observations show that 100% of the photons from the source reach D2 and none reach D1 (figure 2).

Experimental Observation 1

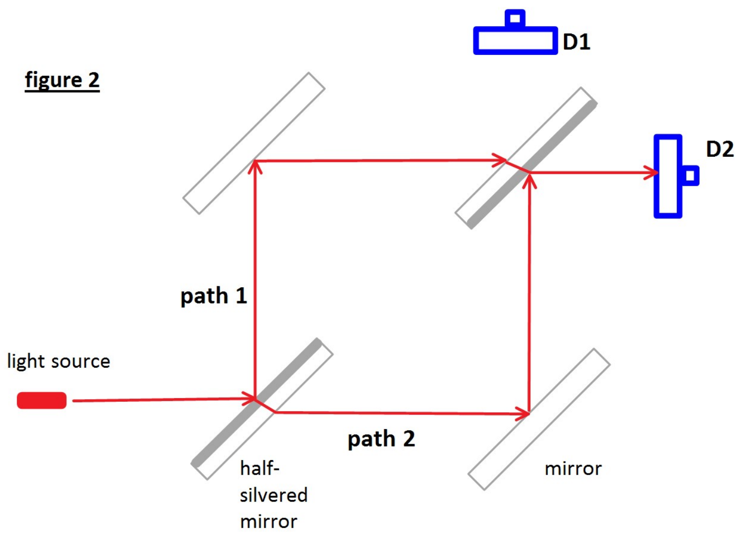


figure 2

The explanation provided by quantum mechanics, which is similar to that given for the results of [double-slit experiments](), proposes that the wave function of each individual photon travels both paths and engages in interference at the half-silvered mirror on the top right and that they interfere destructively at D1 and constructively at D2 (a detailed explanation can be found [here]()).

Applying the QGD optics to analyse the setup, we find a different and much simpler explanation.

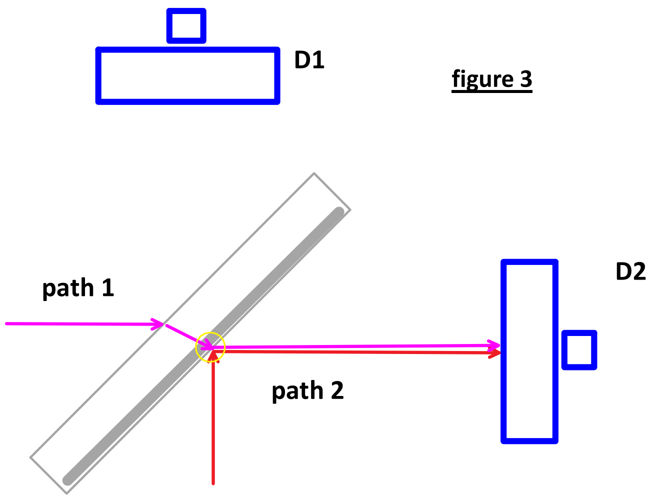


figure 3

At the point of intersection in the top right half-silvered mirror (yellow circle in Figure 3),

$$\left\|\vec{P}_{\gamma_1}\cos_{\theta_1}+\vec{P}_{\gamma_2}\cos_{\theta_2}\right\|<m_{e^-}$$

so that the photons γ_2 are reflected to D2 as per the mechanism of reflection we described above.

Now consider the setup shown in figure 5. Observations show that in this setup 50% of the photons reach D3, 25% of the photons that will reach each of D1 and D2 detectors.

Experimental Observation 2

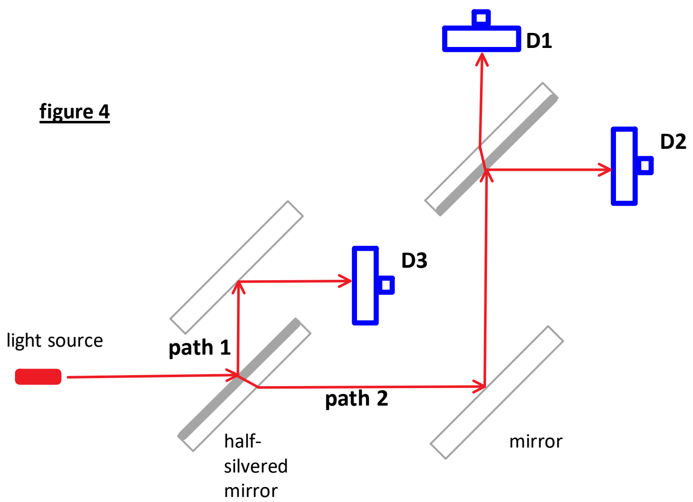
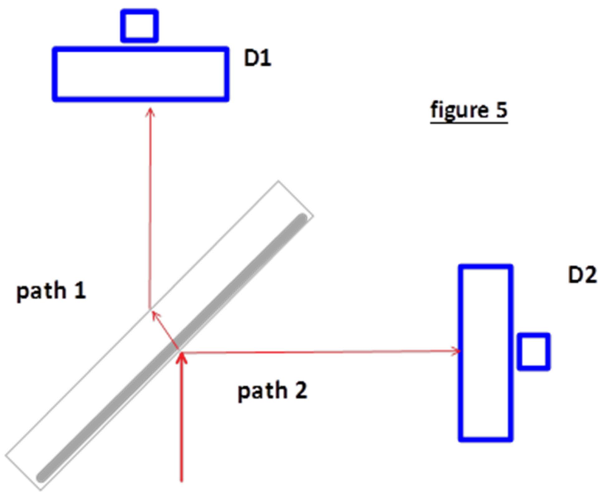


figure 4

According to quantum mechanics, the photons moving along path 2 that reach D1 can only do so if the photons moving along path 1 are deflected towards D3. This raises the question: How the photons that reach D1 know that the photons of path 1 were deflected towards D3?

Quantum mechanics' explanation is that the photons from path 1 and path 2 are entangled, a phenomenon known as quantum entanglement, by which a change done to photons on path 1, by a measurement for example, instantly affects the photons moving on path 2. And, according to quantum mechanics, it does so instantly and independently of the distance that separate the entangled photons. This explanation of course violates locality, but this violation is essential to quantum mechanics if it is to describe the observations of experiments such as the ones we described above. The observations in turn, *as interpreted by quantum mechanics*, support the existence of quantum entanglement and non-locality.



Again QGD provides a much simpler and realistic interpretation of observations. That is: Since no photons from path 1 reach the point of interaction of top right mirror, then then $\vec{P}_{\gamma_1} \cos_{\theta_1} = 0$ and $\left\| \vec{P}_{\gamma_1} \cos_{\theta_1} + \vec{P}_{\gamma_2} \cos_{\theta_2} \right\| > m_{e^-}$. That the mirror is transparent to photons of momenta $\left\| \vec{P}_{\gamma_2} \right\|$, means that $\left\| \vec{P}_{\gamma_2} \right\| \gg m_{e^-}$ so the photons γ_2 from path 2 can be absorbed by the outer electrons and allowed to move towards D1 as per the refraction mechanism we described earlier.

The example above illustrates that the outcome of so-called quantum entanglement can easily be explained classically from a complete physical description of the experiments. Complete physical descriptions of all other experiments supporting quantum entanglement will also provide the basis for classical explanations.