The nature of photon

1. The experimental context.

It is not here to take the long procession of experiments that led to the current situation, but only to recall the experiment of Steinberg. By performing a simultaneous weak localisation and interference, this experiment create a problem thought to be resolved.

In a very general point of view, all issues related to quantum entanglement come from the impossibility of dividing a particle, while the wave itself can be divided of course. Coming back to the pilot wave allow for setting a special nature of the photon by introducing a minor change.

2. The "multiple" photon

Instead of considering the photon as a particle, it could be considered as a set of homokinetic particles, a cloud in a way.

But, in fact, the change is so minor that there is few things to say. Once a set of homokinetic particles is divisible, where are the problems?

3. The emission of the "multiple"photon

The jump or the displacement of an electron produces photons. We do not see how it would be impossible, instead of a single particle, the emission involves a set of homokinetic particles? The idea that the photon is a set of particles does not implies binding interactions. They are only grouped in their movement, like the current set of photons that make up a beam of light. The scale is changed only. But we do not see why what is considered possible for a photon could no longer be valid for a set of particles, even though they have of smaller size, so to say.

However, if we wanted this set to oscillate, it seems essential to introduce a binding interaction between the homokinetic particles. Such a hypothesis would unify the two natures of photon giving a support to the wave aspect, which would have inseparable corpuscular effects.

But this is not a necessity. Indeed, we may as well keep the wave-particle duality, as used for other particles, by giving the very same wave function to each of the particles that make up the multiple photon.

Similarly, one can assign to each particle of the same spin.

The principle of non-location is not specific photon. Multiple photon particles must adhere to this principle.

Under these conditions, the change is very small. It only involves the divisibility of the particle photon. Everything else is unchanged.

4. The corpuscular effects of "multiple" photon

As far as one can speak of the transverse dimension of the photon, we do not see why there would be any difference between the particle photon and multiple photon. The probability for the multiple photon to meet an electron is neither greater nor less than for the particle photon.

Like the particle photon, the multiple photon travels to the speed of light, so that the potential problem of its length does not arise.

The photoelectric effect is related to the frequency, the particle photon and photon multiple are in the same situation.

The multiple photon is divided by the slits of Young, both in terms of its wave nature and its corpuscular nature. Each resulting photon is itself a set of particles, a multiple photon. Their frequency is that of the initial multiple photon.

If the particle photon had energy, then it would have a mass. This is a subject still largely debated, because if he had a mass, it would de facto be infinite in the relativistic point of view.

So that the quantum energy $\hbar\nu$ is not like the others. Otherwise, the photon would have a mass computable. It would, in fact, an infinite number of possible masses, as well as frequency.

The quantum $\hbar\nu$ is related to the vibratory nature of the photon and it is not additive. Each multiple photon obtained after slits of Young, do have a quantum $\hbar\nu$ related to its frequency, which is that of multiple photon before the slits. Rather than a particular form of energy, it would, perhaps, better to call it "capacity" to extract or vibrate electrons.

The multiple photon provides an extremely simple solution to Aspect-type experiments, Steinberg's experience and, last but not least, to interference of Young slit.